

# THE IRON AGE October 18, 1934

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## Contents

The Goose Step Is For Geese .....	11
Public Opinion on Features of New Deal .....	12
Rule by Riot .....	16
Engineering Properties of Cast Iron .....	23
Alloys in the Ferrous Foundry .....	30
Photoelastic Study of Large Castings .....	35
The Case for the Small Emergency Cupola .....	36
Production Experience with Surface Broaching .....	40
Equipment Policies Under Present Conditions .....	43
New Equipment .....	45
News .....	49
Washington News .....	53
Automotive Industry .....	58
Markets .....	61
Construction and Equipment Buying .....	78
Products Advertised .....	122
Index to Advertisers .....	140

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## The Goose Step Is For Geese

TO get an army to march in step requires the elimination of differences of opinion.

So, too, and with equal absolutism, does the intricate timing required in a planned economy necessitate the issuing of orders by an individual or at best a small group.

American progress, and it has been notable progress in the world family, has been largely due to our having so many people "out of step." Progress toward good or bad might have been much faster had we all marched the goose step, but it has been much safer to make our progress through the natural play of differences of opinion as envisioned in our Constitutional plan.

Under that system we do not march in a straight line but move separately, as individuals; some forward, some backward and some sideways. The general movement, however, has been forward because the course taken by the majority has been right more than 50 per cent of the time. Thus we have been able to afford to make mistakes. A dictatorship of planned economy has to be right *all the time*, else it will lead *all* of the people over the precipice instead of into the green pastures.

Under a process of planned economy, the great danger lies that in suppressing those of us who seem out of step with them, the planners are likely to get out of step themselves. Take, for example, some of the pet

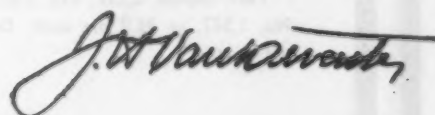
theories of the Presidential advisors which have been imposed upon us as objectives during the past 18 months.

Let us contrast these with majority opinion as disclosed by the remarkable survey just made by the National Industrial Conference Board among 5000 newspaper editors.

This survey discloses that public opinion is 12 to one against any further increase in our national debt; that it is 4½ to one against crop restriction and crop dictation; that it is three to one against the establishment by law and the judicial enforcement of definite standards of business management.

It reveals public opinion as nearly 16 to one against the control of private business enterprises by government bureaus or officials; three to one against the theory of redistribution of wealth or income through government aegis.

Read the details of this survey as presented elsewhere in this issue and see how far out of step with intelligent majority opinion are the "planned economy boys" who have been trying to import and impose the economic goose step upon us.



# Public Opinion On

**A**T the end of July the research staff of the National Industrial Conference Board sent a questionnaire to all newspaper and farm journal editors of the United States, 12,076 in number. In this questionnaire the editors were asked to state what the public opinion in their communities is in regard to some of the important economic and social problems that face the country today. The purpose of the inquiry was to provide industrial management with information regarding public opinion on current economic conditions as a basis for formulating programs of industrial operation during the coming year.

The editors were assured that their individual replies would be held strictly confidential, that the identity of the papers would not be divulged, and that the results of the inquiry would be published only in the form of totals and percentages. The editors were not asked to state the political affiliation of their papers, nor requested to sign their names. They were not asked to record their own opinions, the opinion of their papers, or of their readers on the questions covered. The Conference Board asked them only to state to the best of their ability whether or not public opinion in their community favored or opposed cer-

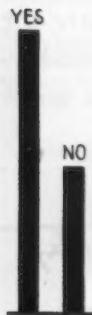
*The principal questions and a summary of the replies received from 5,050 editors, as released by the National Industrial Conference Board, are as follows:*

## Social Insurance



*Does public opinion in your community favor a compulsory Government system of unemployment insurance?*

Total replies, 4,682; Yes, 1,849, or 39.5 per cent; No, 2,724, or 58.2 per cent; Doubtful, 109, or 2.3 per cent.



*Does public opinion in your community favor a compulsory Government system of old age pensions?*

Total replies, 4,599; Yes, 2,970, or 64.6 per cent; No, 1,517, or 33.0 per cent; Doubtful, 112, or 2.4 per cent.

## Cost and Organization of Government



*Does public opinion in your community favor further increase in the national debt?*

Total replies, 4,805; Yes, 353, or 7.3 per cent; No, 4,279, or 89.1 per cent; Doubtful, 173, or 3.6 per cent.



*Does public opinion in your community favor reducing the number of employees on the Government payroll?*

Total replies, 4,838; Yes, 4,224, or 87.3 per cent; No, 515, or 10.6 per cent; Doubtful, 99, or 2.0 per cent.

# Features Of the New Deal

tain specific economic and social policies, and so far as possible to give a definite "yes" or "no" answer to each question regarding those policies.

The questionnaire included 22 principal questions. At the end of the questionnaire the editors were asked to express their own personal opinion concerning the factors that would contribute most toward increasing business confidence in their community.

The Conference Board received 5050 replies from editors of papers representing a total circulation of 24,843,677.

With reference to the question concerning the

choice of factors that in the judgment of editors would contribute most toward increasing business confidence, from 66 per cent to 73 per cent noted "Decreasing Government control," "Decreasing Government expenditure," "Balancing budget," "Stabilizing currency." Only 15.7 per cent favored "Inflation of the currency," and only 8.8 per cent "Increasing Government control." Around 24 per cent mentioned "Tariff reduction" as a factor conducive to greater business confidence, and an approximately equal number favored "No change in tariff." Slightly over 16 per cent favored "Higher tariffs."



**Does public opinion in your community favor application of the Civil Service Law to new agencies of the Federal Government?**

Total replies, 4,584; Yes, 3,572, or 77.9 per cent; No, 926, or 20.2 per cent; Doubtful, 86, or 1.9 per cent.



**Does public opinion in your community favor the fixing of selling prices by the Federal Government for factory products?**

Total replies, 4,681; Yes, 796, or 17.0 per cent; No, 3,784, or 80.8 per cent; Doubtful, 101, or 2.2 per cent.

## Government and Business



**Does public opinion in your community favor the fixing of selling prices by the Federal Government for farm products?**

Total replies, 4,903; Yes, 1,154, or 23.5 per cent; No, 3,609, or 73.6 per cent; Doubtful, 140, or 2.9 per cent.



**Does public opinion in your community favor Government restricting farmers as to what crops they shall plant and what acreage for each crop?**

Total replies, 4,921; Yes, 867, or 17.6 per cent; No, 3,919, or 79.6 per cent; Doubtful, 135, or 2.7 per cent.



**Does public opinion in your community favor Government restricting manufacturers as to amount of goods they shall produce?**

Total replies, 4,780; Yes, 524, or 11.0 per cent; No, 4,153, or 86.9 per cent; Doubtful, 103, or 2.2 per cent.



**Does public opinion in your community favor establishment by law of definite standards of private business management to be enforced by judicial proceedings and court action?**

Total replies, 4,743; Yes, 1,022, or 21.5 per cent; No, 3,609, or 76.1 per cent; Doubtful, 112, or 2.4 per cent.



**Does public opinion in your community favor control of the management of private business enterprises by Government bureaus or officials?**

Total replies, 4,874; Yes, 256, or 5.3 per cent; No, 4,563, or 93.6 per cent; Doubtful, 55, or 1.1 per cent.



**Does public opinion in your community favor Federal Government going into business in competition with transportation companies?**

Total replies, 4,872; Yes, 542, or 11.1 per cent; No, 4,260, or 87.4 per cent; Doubtful, 70, or 1.4 per cent.



**Does public opinion in your community favor Federal Government going into business in competition with power companies?**

Total replies, 4,857; Yes, 1,240, or 25.5 per cent; No, 3,485, or 71.8 per cent; Doubtful, 132, or 2.7 per cent.



**Does public opinion in your community favor Federal Government going into business in competition with other industry?**

Total replies, 4,754; Yes, 170, or 3.6 per cent; No, 4,513, or 94.9 per cent; Doubtful, 71, or 1.5 per cent.



**Would public opinion in your community favor Government taking over the banking system?**

Total replies, 4,756; Yes, 1,691, or 35.6 per cent; No, 2,839, or 59.7 per cent; Doubtful, 226, or 4.8 per cent.



**Does public opinion in your community favor giving administrative officials of the Federal Government sole power to change from time to time the purchasing value of the dollar?**

Total replies, 4,648; Yes, 1,193, or 25.7 per cent; No, 3,283, or 70.6 per cent; Doubtful, 172, or 3.7 per cent.



*Does public opinion in your community favor use by the Government of its taxing power or other powers for the specific purpose of taking away wealth or income from one group and giving it to another?*

Total replies, 4,751; Yes, 1,012, or 21.3 per cent; No, 3,525, or 74.2 per cent; Doubtful, 214, or 4.5 per cent.

## Government and Labor



*Does public opinion in your community favor making membership in a labor union a necessary condition of employment?*

Total replies, 4,888; Yes, 231, or 4.7 per cent; No, 4,601, or 94.1 per cent; Doubtful, 56, or 1.1 per cent.



*Does public opinion in your community believe that the hope of profits is essential to the progress of business enterprise?*

Total replies, 4,859; Yes, 4,581, or 94.3 per cent; No, 234, or 4.8 per cent; Doubtful, 44, or 0.9 per cent.



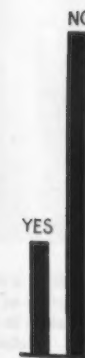
*Does public opinion in your community favor Government fixing of minimum wages?*

Total replies, 4,616; Yes, 2,519, or 54.6 per cent; No, 2,021, or 43.8 per cent; Doubtful, 76, or 1.6 per cent.



*Does public opinion in your community favor Government fixing of maximum working hours?*

Total replies, 4,462; Yes, 2,262, or 50.7 per cent; No, 2,134, or 47.8 per cent; Doubtful, 66, or 1.5 per cent.



*Does public opinion in your community favor Government control or regulation of profits in industries other than public utilities?*

Total replies, 4,780; Yes, 1,205, or 25.2 per cent; No, 3,417, or 71.5 per cent; Doubtful, 158, or 3.3 per cent.



*Would public opinion in your community favor making sympathetic strikes and lockouts illegal?*

Total replies, 4,685; Yes, 3,549, or 75.8 per cent; No, 1,011, or 21.6 per cent; Doubtful, 125, or 2.7 per cent.



## RULE BY RIOT—Organized

**M**ASS picketing and rioting by unemployed hoodlums, together with politics and chicanery, are used to impose unionization on Wisconsin employers and employees.

**U**NDER the New Deal, Wisconsin, for many years largely an open-shop area, has been the scene of many strikes, some of them marked by violence and bloodshed. By the superficial observer, and particularly the labor sympathizer, this epidemic of industrial strife is accepted as a natural reaction from suppression and exploitation. Comments to the effect that "the workers are finally winning their rights" or that "they are throwing off the shackles of industrial thralldom" pass almost unchallenged among disinterested bystanders. Most Americans have been schooled to believe that labor is the underdog in its relations with management, that strikes are usually justified; and, unless they have had practical contact with industrial problems, are not easily dislodged from that viewpoint. It does not occur to them that the facts of the situation in Wisconsin may differ widely from their preconceived notions or that the real

underdog in that State may be the employer.

Yet such is actually the case. What has occurred in the Badger State is so far removed from the picture conjured up by the imagination of liberally inclined third parties that the unvarnished truth can be presented only at the risk of creating skepticism as to its credibility. The adage that truth is stranger than fiction has again been borne out. No adequate idea of what has happened in Wisconsin can be obtained without first abandoning preconceptions based on class-room theories or maudlin sympathies.

### A Drive for Revenue

Summed up, the industrial strife of the past year in Wisconsin is traceable mainly to one thing—the desire of the American Federation of Labor to obtain revenue from a territory that had previously contributed little to its coffers. A year ago the A. F. of L. sent more than 100 paid organizers to Milwaukee alone and these agitators, aided and abetted by the national Administration, local governmental bodies, and radical groups, have succeeded in stirring up most of the industrial conflicts that have ensued.

More than 100 major and minor strikes have been called in eastern

Wisconsin since Jan. 1. Among companies in the metal-working field that have been affected are the Nash Motors Co., Kenosha; the Seaman Body Corp., Milwaukee; the J. I. Case Co. and the Wisconsin Screw Co., Racine;



At top—A favorite method of manhandling a loyal then kick him. In this way identification of his "after" pictures of such an incident, taken in the too quick for the pickets. Below—



# Labor Extends Its Sway By Violence

the Waukesha Foundry Co., the Spring City Foundry and the Glancy Malleable Corp., all of Waukesha; the Ladish Drop Forge Co., the Edwards Motor Co., the Rundle Mfg. Co., the Crucible Steel Casting Co.,

the Globe Steel Tubes Co., the Geuder, Paeschke & Frey Co., the Worden-Al-len Co., the Wisconsin Bridge & Iron Co., the Lakeside Bridge & Steel Co., the Wehr Steel Co., all of Milwaukee or the immediate vicinity; and the Kohler Co., Kohler, Wis.

By G. L. LACHER  
Managing Editor, THE IRON AGE

## Unrest Not Spontaneous

These industrial disputes were not spontaneous with the workers. On the contrary, the relations between employees and employers in eastern Wisconsin were amicable and had been so for many years. Wage rates were as high as or higher than in comparable industrial districts, and the wage earners were industrious and thrifty, usually owning their homes and possessing substantial savings accounts. Except for a few malcontents, who are to be found in every walk of life, the workers were satisfied and loyal. They nursed no long suppressed grievances. They bore no grudges against the companies for which they worked. They, like their employers, were the creatures rather than the creators of the dramas in which they were to play a part.

## The Strike Formula

The formula used by labor organizers to make strikes effective has been uniform in most of the disputes

that have occurred along the Wisconsin shore. First, employees are prevented from reporting for work by mass picketing. For this purpose roving bands of unemployed, all on Government relief (but using their own automobiles!), are called upon for service. In many cases the pickets have greatly outnumbered the employees thrown out of work.

Once the plant is closed, all known forms of trickery, cajolery and coercion are used to drive the workers into the union and to intimidate the employers into a closed-shop agreement. Spellbinders are utilized to persuade the employees that they had better get on the bandwagon. Temporary reductions in initiation fees and threats of subsequent fines are used to induce workers to sign up for union cards.

Government mediators and conciliators appear, who are usually former union officers or academic pro-laborites, and these official agents are frequently accompanied by the professional labor organizers who instigated the trouble. Ordinarily the



employee is to mass around him, trip him and assailants is rendered difficult. The "before" and Kohler strike, are unusual. The photographer was The picket line in the Kohler strike.

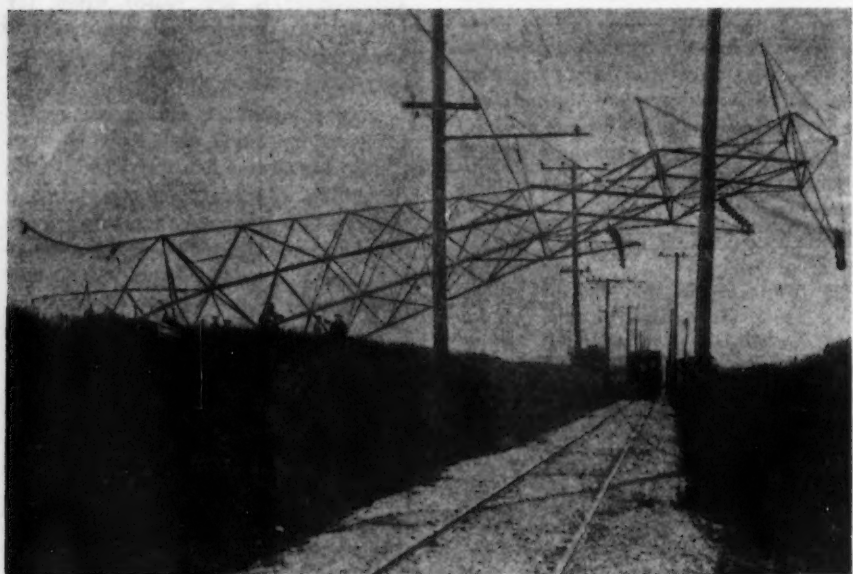


Milwaukee police trying to right a patrol wagon overturned by rioters at the Geuder, Paeschke & Frey plant.

first Government representative to make his appearance is of the bulldozing type and attempts to frighten the management into a settlement favorable to the union. If this strategy fails, a second Federal agent is sent to the scene and he is likely to be a "soft-soap artist," who tries to achieve the same ends by more indirect methods. If he also fails, the union concentrates its efforts on the employees, using promises, threats, misrepresentation, trickery and all the other known arts of stampeding men to induce them to join up. If these measures succeed, a demand is immediately made for an employee election.

While the primary objective of these activities is to obtain the closed shop, wage advances are also asked for. If the employer succeeds in maintaining an open shop he is tempted to grant a wage increase, whether he can afford it or not, as a gesture of good will. But in so doing he runs the risk of playing into the hands of the union organizers, who will claim credit for the advance.

Union organizers are not interested in the justifiability of wage demands. In the case of one Milwaukee plant, now strikebound, they asked for a 30 per cent increase in piece rates.



High-tension tower of the Milwaukee Electric Railway & Light Co. dynamited in strike riot.

The management, which had been negotiating with the union representatives, demonstrated that it had been losing money throughout the depression and that such an advance in piece rates would mean a further loss of \$200,000 a year. The answer of the union attorney was that the extra expenditure should be drawn out of surplus or out of the private fortunes of the officers. When he was told that neither source would yield such a sum, he suggested that the money be borrowed from the banks. Either he was not sincere in his suggestion or was woefully ignorant of banking operation.

### Wearing Employers Down

But a lack of sincerity is the more probable explanation of his proposal. Throughout their dealings with labor leaders Wisconsin employers have found dependability and integrity peculiarly lacking. Time after time they have come to terms with union agents only to be informed subsequently that the settlement did not meet with the approval of the men. Of course, this strategy is employed to wear the employer down to the point where he will surrender to all demands, including an air-tight closed shop, but it does not win the employer's respect for union leadership or his faith in union agreements.

A recent example of sharp practice of this sort was the calling of a meeting of employees for the approval of terms that had been proposed to the management. The employer appeared at the meeting and a settlement was reached and approved by a poll of those present. It later developed, however, that the union had purposely directed a considerable number of employees to stay away from the meeting, and, on the excuse that the wishes of that group had not been consulted, demanded a new meeting. The employer, justifiably exasperated, replied that he would attend another meeting but would not appear on the scene until he was assured that all of the union members were present.

### Boring from Within

Chicanery after a strike has been called is sometimes matched by trickery before such action is taken. In a few instances the ground for a unionization drive has been laid months in advance by boring from within. For instance, about a year ago an employee approached the head of a Milwaukee plant and suggested the organization of an employee representation plan. While

the employer had always maintained close individual contacts with his men, he saw no particular harm in the proposal and encouraged the employee to go ahead. Employee representatives were chosen in due course and among them was the originator of the plan, who soon assumed a position of leadership. One of the first acts of the new organization was to forbid individual employees to have contact with the management except through their representatives. This ruling passed unnoticed for the time being but was rendered highly significant by subsequent developments.

### Disillusioned

Believing that the employee organization provided insurance of continued friendly relations between management and men, the employer promptly sought to strengthen it by giving it tangible recognition. Calling in the representatives, he suggested a wage advance, not a horizontal increase, but one that would be proportionate to the individual capabilities of the men. Lists were prepared and increases were agreed upon without developing many divergences between the views of the management and the representatives.

The announcement of the changes was made through the employee representatives and the employer assumed that, while he had strained a point so far as the books of the company were concerned in increasing his wage outlay he had at least cemented the bonds of friendship with his employees. All seemed to go well until one day, without warning, the employees' organization voted to affiliate with a national union. Then he learned too late that he had been a victim of misrepresen-



A plant driveway strewn with bricks and rocks after the Kohler riot.

tation, that among other things the leader of the men and the originator of the employee representation plan had circulated the story that the wage advances had been extorted from an unwilling management under the threat of concerted action.

Boring from within, however, takes time. Usually almost as effective re-

sults can be achieved by resort to violence and intimidation. It is no exaggeration to say that, in Wisconsin at least, the A. F. of L. has found it possible to extend its rule by riot. Late in June a strike was called on the Milwaukee Electric Light & Railway Co., a public service company supplying light, power and electric railway service to Milwaukee and vicinity. Only 157 out of 4700 employees went out, and service was continued until mass picketing intervened.

On the night of June 27, a mob of several thousand, few if any of whom were company employees, gathered at the Kinnickinnic Avenue station. Trolleys were pulled from the wires, the windows of cars were smashed, doors were torn off, air was cut off between two-car trains, tracks were blocked and motormen were jeered, threatened, and, in some cases, beaten. For several hours the police battled with tear bombs and clubs to disperse the mob. Similar riots, smaller in scope, occurred at other car barns of the company.

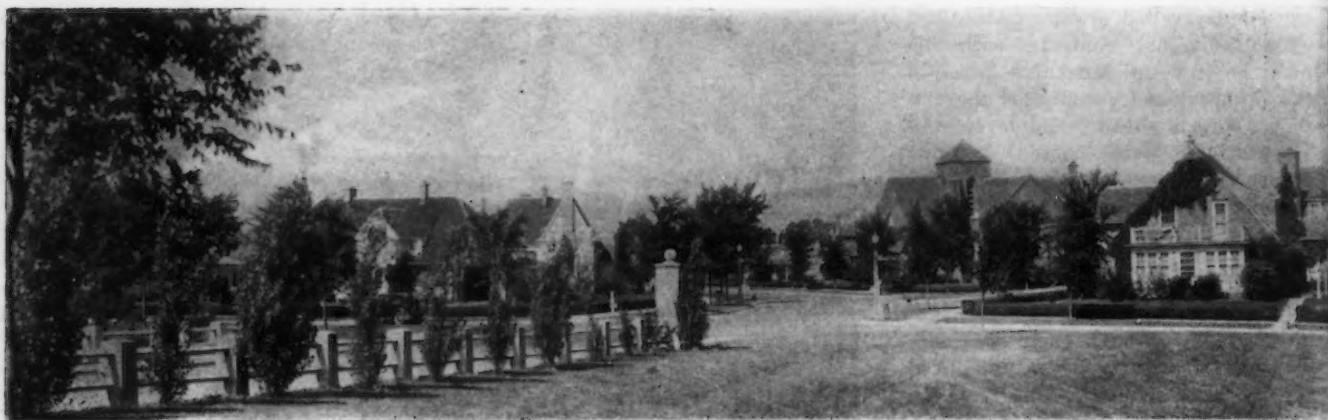
On the following night a crowd of more than 5000 men made a concerted rush on the Lakeside power plant of the company. The attackers, who hurled stones and brickbats, and tore down fences, finally retreated under a barrage of tear bombs and water. The casualties included two rioters that were electrocuted when, in dashing over a fence, they contacted a live wire.

### An Invitation to "Raise Hell"

Rioters that were arrested were either freed by the court or dismissed with a fine of a few dollars. The Socialistic mayor virtually gave his



Virtually every pane of glass in the Kohler plant was smashed.



approval to the disorders when he addressed a letter to the public service company saying: "You are witnessing the harvest of pent-up public indignation which you yourself have aroused. The caging of your street cars with fence wire is an open invitation to violence."

Suffice it to say the attitude of the courts and the mayor dampened the ardor of the police and encouraged further resort to brute force. It was characterized at that time as an invitation to "raise hell" and subsequent events indicated that the invitation was accepted. Moreover, the example set by Milwaukee led to other serious outbreaks elsewhere.

#### Patrol Wagon Overturned

Among subsequent Milwaukee riots was one at the plant of the Geuder, Paeschke & Frey Co. The fighting broke out on the morning of Sept. 6, when pickets tried to prevent office workers from entering the plant. When policemen attempted to clear a path through the pickets, one officer was thrown through the glass of the factory door and was so severely lacerated that he had to be taken to the county emergency hospital. Another officer was kicked in the groin and likewise had to be removed to the hospital. When finally certain pickets were arrested, the remaining rioters overturned a patrol wagon.

#### Fifty-four Years of Industrial Peace

The Geuder, Paeschke & Frey Co. has been in business for 54 years and has never before had any labor trouble. Having been subjected to agitation by outside labor organizers early this year, the company called a mass meeting of employees on July 26 and put its cards upon the table. As a result, an employees' representation plan was adopted by a vote of 700 to 5, 140 ballots remaining blank.

On Aug. 13 mass picketing was em-

ployed to keep workers from entering the plant. The company did not attempt to operate, preferring to avoid possible injury to its employees. However, on Sept. 15 it sent out a questionnaire asking employees to indicate whether they were willing to come back to work. Despite the fact that the union had demanded that all letters from the company be delivered to union headquarters and sent out a motorcycle squad to the homes of employees to collect letters that had not been turned in, the company received 250 replies. In each case the worker indicated his desire to return but stated he was afraid to do so because of possible physical harm at the hands of the pickets.

#### Seven Employees Vote for a Strike

Violence was also resorted to at the Wehr Steel Co., West Allis, Wis. On July 9, without prior notice, a crowd of pickets assembled before the entrance to the shop and declared that a strike was on. Only a few of the pickets were recognized as employees, the remainder being strangers. Yet the workers were warned to lay down their tools. Investigation by the management disclosed that the employees knew nothing about the strike and were satisfied with their wages and working conditions. One hundred and five out of 178 on the payroll voluntarily signed a paper voicing their desire to continue at work unmolested.

It was later learned that a union meeting had been held on the previous day and that only 12 Wehr employees attended, of which seven voted for a strike and five against.

#### Assailants Freed, Attacked Jailed

On the first day of the strike 62 of the 178 employees got through the cordon of pickets and reported for work. On the second day 50 got through, and on the third day only

two ran the gauntlet. On this last day the pickets overturned an automobile containing 11 employees on their way to work. These 11 men were arrested, lodged in jail and fined a total of \$120. Only two of the pickets who upset the car were arrested and their cases were dismissed. With no hope of justice in



Each home in Kohler village is so attractive that be delighted

▲ ▲ ▲  
At left—A scene in beautiful Kohler village. At right—the American club, home of single employees.  
▼ ▼ ▼



the courts and fearing serious injury to its employees, the Wehr management closed its plant and paid off all employees in full. Another result of the rioting by pickets was the smashing of the plant windows, incurring damage estimated at \$500.

The employees thrown out of work by the so-called strike were immedi-

ately put on relief by the county relief organization. In fact, emissaries of the relief office sought out the men and encouraged them to accept Government aid, whether they needed it or not. Then mediators arrived and there was a persistent attempt to induce the company to sign a closed-shop agreement.

Picketing continued from day to day and was even extended to the home of C. F. and Henry Wehr, heads of the company. Two pickets carrying derogatory banners paraded back and forth in front of the house from morning till night. Four others were stationed in an automobile parked at the curb above which a sign, 4 x 16 ft. was carried. Among the inscriptions were the following: "Mr. C. F. Wehr, you are a visitor on this earth for only a short time. Why starve the innocent women and children?" "Wehr Steel Co. gave us a raw deal instead of a new deal."

Despite all of these activities, organized labor made little progress in gaining adherents among Wehr workers. Originally probably not more than ten were in sympathy with the strike and at no time were there more than 30 or 35 favorable to it. The weeks dragged on and finally on Aug. 20 the management wrote the men and asked them if they were willing to return to work. One hundred and twenty-six out of a total payroll of 178 replied that they wanted to return. Early in September the strike collapsed and the plant was reopened.

#### Employees Apply for Injunction

Neither the management nor the workers, with the exception of a few malcontents, had played any part in causing the long interruption in operations and both had suffered thereby. Mass picketing by outsiders, which had forced the suspension at the Wehr plant, was also employed to close the Wisconsin

Bridge & Iron Works. In this case the employees were so incensed at being forcibly deprived of the right to work by irresponsible third parties that seventy of them appealed to the circuit court for an injunction to restrain officers and members of the union which instigated the strike from interfering with their entry to and egress from the plant. The case is the first of its kind in any court, it is said, and may establish a new principle of law relative to the right of the employee to security in his work.

#### A Strike Against the FERA

Those who have had not been on the ground in Wisconsin and do not enjoy first-hand information regarding the facts may be skeptical regarding the existence of the picket army of outsiders which has been employed on all fronts by union organizers. The action of these unemployed hoodlums in calling a strike against the Federal Employment Relief Administration itself should be enough to dispel any lingering doubts. Under the relief system as administered in Milwaukee workmen on "made work" projects received approximately the same pay as they would get in direct relief if they were idle. The unemployed on relief evidently saw danger in this equality, sensing the possibility that they might eventually be forced to work for their relief rather than loaf. Incidentally most of the direct relief recipients had consistently refused FERA jobs when they were offered.

#### Encouragement from a Socialist Mayor

The strike was called on Aug. 16. In this case, as with the industrial conflicts cited, the strike was called by pickets rather than by the workers actually affected. Traveling in their own automobiles (sic), roving bands of idle men on the FERA dole



any one, regardless of financial standing, would to live in it.

swooped down on one relief project after another inflicting severe beatings on workers who refused to lay down their tools. In view of the mobility of the pickets the police and county authorities found it difficult to suppress the attacks on the workmen. In West Allis, a Milwaukee suburb, the Socialist mayor forbade the police to protect FERA projects. The West Allis common council ordered work stopped on all projects following his announcement, but later rescinded its action by unanimous vote. The demands of the unemployed were that relief workers be paid a wage scale of 83½c. an hour for unskilled labor, \$1 an hour for semi-skilled workers, and the union rate for skilled help. The common labor rate asked was far above the average paid in Milwaukee.

#### Federal Support Acknowledged

The picket army, the laxness of Socialistic local governments in maintaining law and order, and the aid and sympathy of Federal authorities have been powerful allies of organized labor in its invasion of Wisconsin. In acknowledgement of Federal assistance, Joseph Padway, counsel for the Wisconsin State Federation of Labor, has gone on record as follows:

"National labor board influence and direction were instrumental in obtaining our objectives in a large number of the settlements, and Wisconsin labor, perhaps more than in any other State, owes thanks to the national Administration for the gains made this year. In no other State has labor been as active and unionization made as much progress as in the State of Wisconsin."

#### Labor Looks Northward

Encouraged by their success in Milwaukee and other southern Wisconsin industrial cities, labor leaders cast their eyes toward the Kohler Co., at Kohler, Wis., 55 miles north of Milwaukee.

The Kohler management had won world-wide distinction for its enlightened industrial relations policy. In its entire history of 61 years it had never had differences with its men. Inspired by the example of the founder, John M. Kohler, a sturdy pioneer of outstanding integrity and with a keen sense of social responsibility, his sons, ex-Governor Walter J. Kohler, president of the company, and Herbert V. Kohler, executive vice-president, envisioned their enterprise as a common undertaking for the mutual benefit of employer, employee, stockholder, customer and the

public, rather than as merely a source of profit.

#### A Model Industrial Village

In 1913 the village of Kohler was incorporated and the best available talent was obtained to lay it out, landscape it and insure architectural harmony and good taste in the construction of its dwellings. Most of the houses were built by the Kohler Improvement Co., a non-profit development corporation. The houses were sold, not rented—at cost. Financing was provided by a building and loan association. Other structures erected included a village hall, an excellent public school consisting of elementary grades and junior and senior high schools, a large club building where single men can reside at reasonable rates, and the Waelder Haus, a beautiful Tyrolese type of structure, built in memory of John M. Kohler and given to the Kohler girl scouts by his daughter, Marie C. Kohler.

The village of Kohler is justly renowned as a model industrial community. So beautiful are its dwellings that any American, regardless of his financial standing, would be proud to occupy one. It is true that the village has not grown as rapidly as the company's payroll and that perhaps 75 per cent of the employees must live elsewhere, but their homes in nearby Sheboygan Falls and Sheboygan are comfortable and neat, if not so tastefully designed and landscaped as the Kohler houses.

The risk of making a unionization drive against the Kohler Co. was, therefore, great, but the prize to be gained if success were achieved was equally great. If organized labor could fasten the closed shop on a company that had done so much for its employees, it would materially enhance its prestige and render victories over other strongly entrenched companies easier.

#### Massed Pickets Riot at Kohler

On July 16 a small number of employees and former employees called a "strike." Subsequently their numbers were augmented by hundreds of pickets who had never worked for the company. Employees were threatened and intimidated, and as a consequence the plant was shut down. On July 27 the pickets, in violation of their word, prevented a car of coal from entering the plant, thereby threatening the water supply of the village which is obtained from the plant. Since the security of the community against fire was threatened, county deputies and village police

sent for the car and stood guard while it was delivered. They then cleaned up the improvised forts which pickets had located on company-owned grounds to the rear and east of the plant and collected half a truck-load of blackjacks, clubs, brickbats, slingshots and other weapons.

That evening a shouting mob of several thousand people collected around the plant and attacked the factory, office and the medical department notwithstanding that operations had been suspended for two weeks. Virtually every pane of glass in the plant was broken. The mob then rushed toward the village, and the village police released gas bombs in an attempt to stop the onslaught. It was only when the lives of women and children in their homes were threatened that the police resorted to the use of firearms. The rioters were finally driven out and the National Guard was called in to patrol the plant and village.

#### "Take the Plant; It Is Yours"

Besides employing the familiar picket army, organized labor brought in speaker after speaker to inflame the minds of employees against the company. One orator introduced by the union organizers was a former Socialist sheriff of Milwaukee County, who openly incited the mob to violence. "Take the plant," he said. "It is yours."

#### When an Election Is Not Final

Government mediators appeared and regional and national labor boards intervened. Finally an employee election was ordered by the Federal authorities and was held under their conditions and auspices. The vote was 1063 for the Kohler Workers' Association against 643 for the Federal union of the American Federation of Labor. Despite this decisive defeat for the union forces, they have refused to withdraw their pickets and have demanded a new election under different conditions. In other words, they will not be satisfied with an election until they win. Another sequel was the introduction of a resolution at the American Federation of Labor convention at San Francisco calling for a boycott against the Kohler Co.

#### Unselfishness Penalized

The union drive on the Kohler plant was one of the most dastardly moves in the annals of organized labor. It is a stench in the nostrils of all fair-minded and law-abiding

(Concluded on Page 76)

# Engineering Properties of Cast Iron

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By E. A. PIPER

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**T**ECHNICIANS have called our present period the "alloy age," which is due acknowledgment of the marvelous development in metallurgy in recent years.

The designer of apparatus and machinery has now at his service not only alloys of remarkable physical properties, but also a choice of materials with definite chemical characteristics; alloys which will withstand the attack of alkalis or acids; corrosion-resistant and stainless metals. Many alloys combine desirable physical with desirable chemical properties.

As the number of varieties of alloys increases, however, it becomes more difficult for an engineer to make the proper selection of the material for his particular application, and unless he is continuously in touch with the new developments in metallurgy and has a fair understanding of metallurgical principles, he might become confused with the multitude of trade names and the many claims made for the alloys. Although many alloys have proved their worth beyond expectations, other materials appeared to be serviceable either for a limited application only, or were unable in actual service to approach the claims made for them.

## New Conception of Cast Iron as Engineering Material

The metallurgy of cast iron has received a new impetus from the developments of alloys and we find that the base of a great many alloy metals marketed under high-sounding trade names is the humble and ancient cast iron. Metallurgists have not only produced alloy cast irons with previously unheard of properties, but prin-

**T**HAT cast iron still is a material of prime importance is not so much the burden of the accompanying article as that its field of preeminence is becoming more clearly outlined. The metallurgy of cast iron meanwhile has received a new impetus from the development of alloys, and the result is that handbooks as a rule do not contain the up-to-date information called for by designers. To assist such engineers, Mr. Piper has presented here in concise form what is generally asked for. Special attention may be called to the section on damping, with its virtual assertion that in the recent past the pendulum was allowed to swing too far away from cast iron, as in the construction of machine bases. The rather complete section on transverse strength contains data of original work of the author.

cipally have lifted the plain gray iron out of the doldrums and have given engineers and designers a new conception of this engineering material.

Cast iron, itself an alloy, now competes successfully with the modern alloys and steels. Cast iron is a term covering a series of iron-silicon-carbon alloys, which also contain manganese, phosphorus and sulphur. The term applies to gray iron as well as to white and chilled iron.

By proper manipulation of the principal constituents of cast iron a wide range of physical, electrical and chem-

ical properties can be obtained, and if it can be said of any metal that it can be made to order for a particular application, it certainly applies to cast iron.

Progressive foundries are able to furnish castings with high physical properties, with high fatigue limits, or castings possessing high damping capacity suitable for high-speed machinery. If heat-resistant parts are desired, these also can be furnished of a specially suited cast iron. Some applications require heat and wear resistance as well as lubricating qualities, as, for instance, in Diesel engine cylinders. Cast iron can be furnished with good magnetic properties, or, on the other hand, may be made practically non-magnetic. Other varieties of castings have to resist distortion and growth at high temperature, while still others are made for resistance against abrasion or corrosion.

## Handbook Information Commonly Antiquated

Due to the rapid development of the gray iron metallurgy, dissemination of information through literature, handbooks, etc., has been lagging considerably. Even recent issues of engineering handbooks present the chapter on physical properties of cast iron practically unrevised, and again and again we find that properties of certain alloys or welded steel structures are compared with cast iron on the basis of the antiquated information found in handbooks.

Many discussions on design, supposedly scientific, appearing in trade journals are wholly erroneous, because of the comparison with a cast iron of

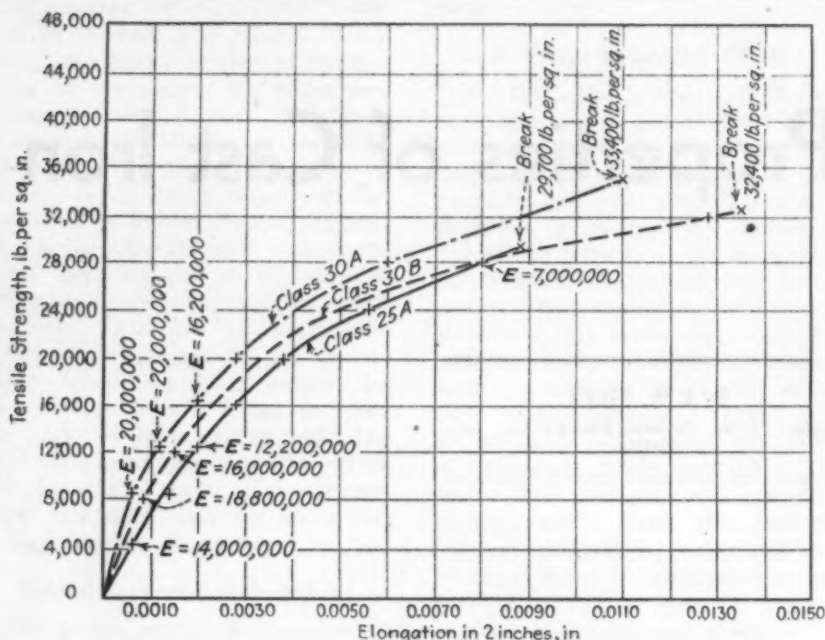


Fig. 1—Tensile tests of three classes of cast iron; 25A, of 2.60 per cent silicon; 30A, regular iron with 0.50 per cent molybdenum; 30B, iron with 15 per cent steel scrap and of 2.15 per cent silicon. The test bars in the case of the first two irons were 0.798 in. in diameter, machined, showing a permanent set of 0.0026 in. in 2 in., while the test bars for the 30B iron were 1.10 in., machined, and the permanent set in 2 in. was 0.0060 in.

physical properties which might have been representative of this material 50 or 100 years ago.

The purpose of this paper is to present the engineering properties of the cast iron of today, putting special stress on such fundamental properties as tensile, compression, transverse and fatigue strength. All information given is a collection of facts on modern gray iron. The section on transverse strength contains data which the author obtained with the aid of V. Mazurie.

### Tensile Strength

ENGINEERING handbooks state that the tensile strength of cast iron is 15,000 to 20,000 lb. per sq. in., and some of the more recent editions give a figure of 25,000 lb. for a high-grade iron. The modulus of elasticity is about 10,000,000 lb. per sq. in., according to the same source.

The Gray Iron Founders Society tested hundreds of test bars from 37 different sources in a recent survey, and reports that 20,000 lb. is the lowest tensile strength figure encountered. Most common grades of iron have a tensile strength between 25,000 and 30,000 lb. per sq. in.

The latest A.S.T.M. (American Society for Testing Materials) specifications for gray iron castings list seven different classes of gray iron according

to tensile strength, ranging from 20,000 to 60,000 lb. per sq. in., which illustrates quite forcibly that with the term "cast iron" a series of materials with a large range of physical properties is covered. The seven classes of iron mentioned are commercial irons obtainable in jobbing foundries; however, they do not represent the ultimate in strength which can be attained especially with alloy cast irons. Tensile strengths of over 100,000 lb. per sq. in. have been reached with heat-treated castings. Automotive camshafts are poured from an alloy cast iron having a tensile strength of 60,000 to 70,000 lb. per sq. in., and a modulus of elasticity of 24,000,000 lb. per sq. in.

Fig. 1 shows a stress-strain curve of three grades of iron. One is a regular soft iron used for light work, while another is a 15 per cent steel mixture used on medium-weight castings, where a tensile strength of 30,000 lb. per sq. in. is desired in sections of  $\frac{3}{4}$  to  $1\frac{1}{2}$  in. The third represents the same regular iron with an addition of 0.50 per cent molybdenum. The regular iron has an ultimate strength of 29,700 lb. and a modulus of elasticity of about 14,000,000 in the range of the safe working stresses generally applied. The test bar of the 15 per cent steel mixture breaks at 32,400 lb., while the modulus of elasticity is between 20,000,000 and 18,800,000 up to a stress of 8000 lb.

The large range of properties available in cast irons makes it imperative for the engineer to specify the type of iron desired for a casting, and in this connection it is recommended that designing engineers become familiar with the aforementioned specification (A.S.T.M., A 48—32 T).

The strength of cast iron is greatly modified by the cooling rate of the casting, which is expressed by the proportion of volume of the casting to the surface.

With increasing section of metal the strength decreases. Although this mass effect on the strength complicates somewhat the problem to predetermine the strength of certain parts, it is not as difficult as it might appear, because the variation of strength with section is now quite definitely established. Table I is the result of a study by the Gray Iron Founders Society on 37 different foundry irons and gives average values of strengths remaining in iron when cast in various diameters of tensile bars.

TABLE I—Tensile Strength of Iron as Affected by Section

Size of Section, In. . .	%	1.1	1.6	2.0
		Lb. per Sq. In.	Per Cent	Per Cent
Class 20A . . .	20,000	79	60	53
25A . . .	25,000	81	73	72
30A . . .	30,000	78	71	67
35A . . .	35,000	83	68	66
40A . . .	40,000	85	80	67
50A . . .	50,000	90	79	72

It will be noted that the higher-strength irons are less affected by section changes than the weaker varieties.

From the study of this table it will become clear why it would be meaningless to specify a tensile strength of cast iron without stating the size of section in which this strength is desired. The above-mentioned A.S.T.M. specification gives full consideration to this condition by calling for three different sizes of test bars according to controlling sections of the casting. Test bar A, which is 0.875 in. in diameter, is to be used for sections up to  $\frac{3}{4}$  in.; bar B, of 1.20 in. diameter, for sections from 0.76 to 1.10 in., and the C bar, for sections of 1.11 to 2 in. Test bars cut out from sections of castings have shown fairly close agreement with the results from the separately cast bars.

### Compressive Strength

THE compressive strength is one of the most valuable properties of cast iron, being greater than that of any of the common metals. Kommers & Moore<sup>1</sup> have tested 18 different mixtures varying in tensile strength from 20,000 to 50,000 lb. per sq. in. and found that the compressive strength is

<sup>1</sup> Kommers, Proc. A.S.T.M. 1929, page 100.

more than three times the tensile property in any case. First signs of buckling appeared at twice the tensile strength. A safe average value for the designer to use is, "compressive strength equals  $3\frac{1}{2}$  times tensile strength."

### Transverse Strength

**B**ENDING stresses in cast iron beams defy mathematical analysis on account of the great many variables which will affect the ultimate strength. The conventional beam formulas for ductile materials is not applicable to cast iron beams because cast iron does not obey Hooke's law of proportionality of stress and strain. Cast iron beams are stronger than the conventional beam formula would indicate, and certain unsymmetrical sections are even stronger in cast iron than in steel, although the tensile strength of the iron may be half that of the steel.

The design of cast iron members subjected to bending must proceed on the basis of strength comparison with similar sections which actually have been tested. This method, if proper attention to cooling rates is given, is accurate enough for most practical purposes. No serious mistake can be made if it is kept in mind that a cast iron member, no matter what type of section, will be at least as strong as the ultimate figured from the beam formula. In order to get the greatest efficiency, i.e., the lightest section to carry a given load, a section with a large tension area must be chosen, so that the high compressive strength of cast iron is taken full advantage of. A symmetrical section is not economical, since the metal above the neutral axis is understressed. The best proportions are obtained by choosing a section in which the centroid is located about one-third to one-quarter of the total height of section from the tension flange, the intensity of compression stress will then be two to three times the tensile stress.

However, excessive accumulation of metal in the tension flange must be avoided, as the cooling rate will then decrease and cause a loss of strength. A judicious removal of metal will quite often result in a stronger casting. Drastic changes in section thicknesses will not only weaken a casting due to the mass effect on the tensile strength, but also might render the casting unsound.

The fact that the modulus of rupture of cast iron beams is in some cases as high as two times the tensile strength has led some to believe that

the neutral axis of a loaded beam shifts toward the compression area and thus brings a larger area into the tension field.

In order to test this theory and also to check the empirical formula for transverse strength of cast iron by Prof. von Bach<sup>2</sup>, the various sections shown in Fig. 2 were broken in a transverse test with supports 24 in. apart. Aside from the sections shown in Fig. 2, a  $3\frac{1}{2} \times 1\frac{1}{2}$ -in. bar was also subjected to a transverse test. Not only were defections at various loads noted, but the elongations of fibers in various heights were determined with the aid of a Berry strain gage, which reads in 0.0002 in. in 8-in. length.

All bars shown in Fig. 2 were cast on end in dry sand and were aged for about three months. A similar test previously made on a green casting showed erroneous results due to initial

casting stresses, and it should be noted here that it is quite important to relieve casting stresses by proper aging or annealing in castings which will be submitted to high working stresses.

The iron mixture from which these bars were cast is represented by the tensile test bar of regular iron in stress-strain diagram, Fig. 1. Tensile and transverse sample pieces were poured from the same ladle, two of each kind. The test results of only one of each specimen are recorded here, since the figures from the duplicate specimens did not vary more than 5 per cent from the first. The regular iron is a soft iron used for general light work, where good machinability is the primary consideration. The  $3\frac{1}{2} \times 1\frac{1}{2}$ -in. test specimen was cast of a 15 per cent steel mixture, represented by the respective curve in Fig. 1.

Diagrams of Fig. 3 show the read-

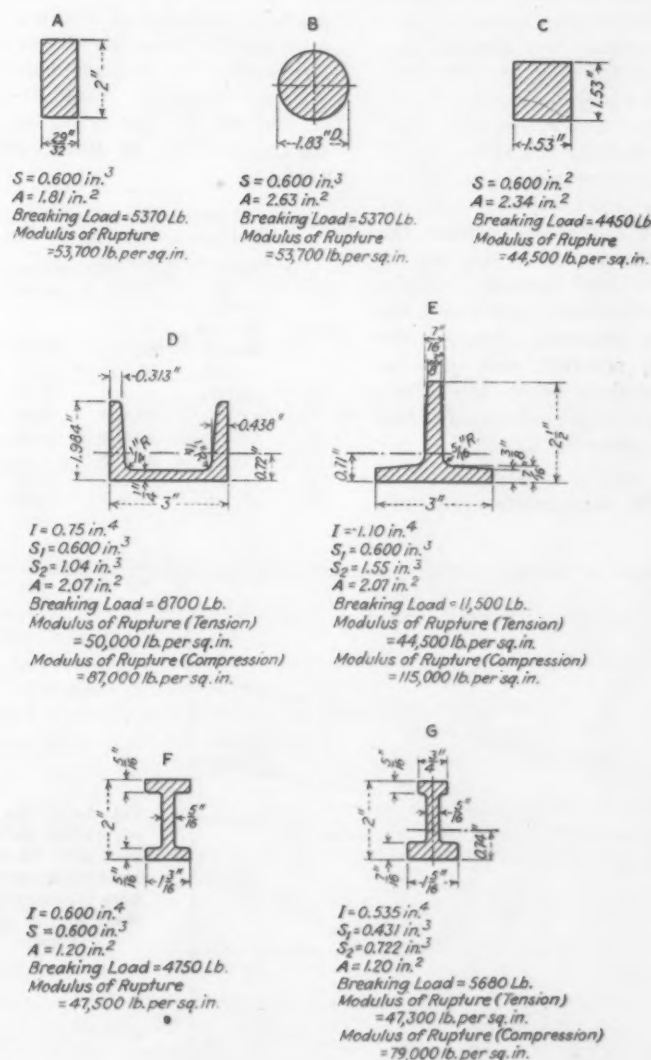


Fig. 2—Transverse tests were made of cast iron of the cross-sections here shown, the bars cast on end in dry sand and aged for three months.

<sup>2</sup>C. Bach "Maschinen Elemente," Part 1, page 59.

ings of the strain gage graphically for the 3½ x 1½-in. bar, the 2 x 29/32-in. bar and the channel sections at various loads. Strain gage readings of the rest of the sections shown in Fig. 2 were quite similar and therefore are not recorded here.

It is interesting to note the raising of the neutral axis with increasing load in each case. The 3½ x 1½-in. bar was not broken, and after the 17,000-lb. load was removed a permanent set was recorded, which indicated a neutral axis located still higher than the one noted at 17,000 lb. The neutral axis of all specimens appeared close to the theoretical centroid, except for the channel section, where the neutral axis remained distinctly below the centroid at any load.

If a comparison is made between the apparent stresses calculated from the beam formula and the actual stresses arrived at from the actual elongations of the fibers, i.e., if the corresponding tensile stresses to the elongations from the transverse test are determined from the stress strain diagram, Fig. 1, the actual stresses are considerably lower than the apparent stresses. The tables in Fig. 3 give the elongations at various loads, the corresponding tensile stresses and the calculated or so-called apparent stresses, as well as the ratio of these latter stresses. In most instances the difference between the actual and the apparent stresses increases as the load increases. Since, at all the intermediate loads listed, the neutral axis remained close to the mathematical centroid, and in some cases even slightly below, the difference in stresses is not accounted for by shifting of the neutral axis.

All cross-sections of bars shown in Fig. 2 have the same minimum section

modulus, except section G, which has the same area as section F. Sections D and E have the same minimum section modulus as well as the same area.

If these sections were made of rolled steel with a tensile strength of, say, 55,000 lb. per sq. in., failure of these members would occur at a load of 5500 lb. In cast iron, however, an entirely different picture presents itself. The T-section is two and one-half times as strong as the symmetrical sections, and it is just again as strong as a similar steel section would be. The T-section is by far the most efficient section, and it might be stated that, although the load was concentrated at the narrow edge of the web, no signs of buckling appeared; failure here, as in all other cases, was apparently due to the tension stress.

The modulus of rupture for all specimens is considerably higher than the tensile strength of the material. The ultimate stress of the 0.798 diameter tensile test piece was 29,700 lb. per sq. in., and in order to arrive at a ratio of modulus of rupture to ultimate tensile stress, the tensile strength figure must be modified according to section thickness. Table II gives a comparison on that basis, as well as the ratio found by Bach's empirical formula:

TABLE II—Tensile Strength of Iron Castings of Sections of Fig. 2  
Modulus Estimated of Tensile Rupture, Strength,

Section	Lb. per Sq. In.	Lb. per Sq. In.	Ratio	Bach Ratio
A	53,700	29,700	1.80	1.42
B	53,700	21,000	2.56	1.70
C	44,500	22,500	2.00	1.42
D	50,000	40,000	1.25	1.23
E	44,500	37,000	1.20	1.23
F	47,500	39,000	1.22	1.21
G	47,300	36,000	1.31	1.25

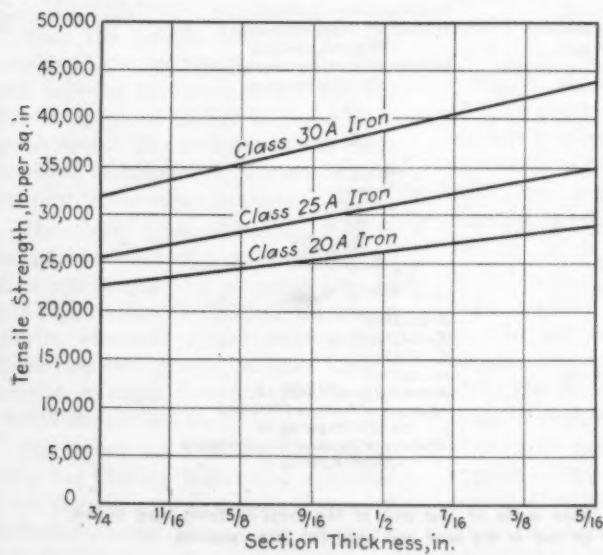


Fig. 4—As the casting section increases, the unit tensile strength decreases, as here indicated for the three classes of cast iron.

The tensile strengths in above table are corrected according to diagram, Fig. 4, and also Table I, both of which are the result of a great number of tests carried out by the Gray Iron Founders Society.

Bach's formula for cast iron members in bending is as follows:

$$t_b = t_s \sqrt{\frac{e}{z}}$$

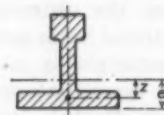


Fig. 5—Sketch to show the distances of the tension fibers in considering bending formulas.

$t_b$  = maximum unit tensile stress in bending.

$t_s$  = actual tensile strength of the iron.

$e$  = distance of centroid from extreme tension fibers.

$z$  = distance of centroid from center of gravity of tension area. (Fig. 5.)

The value of  $t_b$  is to be introduced into the regular beam formula in order to arrive at the ultimate load. The Bach ratio referred to in the above table is calculated from the square root of the

Bach formula, i.e.,  $\sqrt{\frac{e}{z}}$ .

The conclusions to be drawn from these tests are:

1. The plastic yield of cast iron is not enough to permit the shifting of the neutral axis in bending which would permit an increase of the intensity of the compression stress and a decrease of the tensile stress.

2. The difference between the actual stress and the modulus of rupture as calculated from the beam formula is only to a small degree due to the upward shifting of the neutral axis and to a large degree due to some other factor, possibly a high degree of internal friction, which may also account for the right damping capacity of cast iron discussed later on in this paper.

3. The breaking loads of sections D, E, F, G, show very close agreement with the Bach formula, while for sections A, B, C, the Bach values prove to be very conservative.

4. Bach's ratio for rectangular and square sections is the same, while the test shows a much higher value for the rectangular section, which is, of course, to be expected, since the cooling rate of the rectangle is greater than that of the square.

Tests on round and square sections by different investigators have sometimes shown opposite results, some claiming higher strength for round

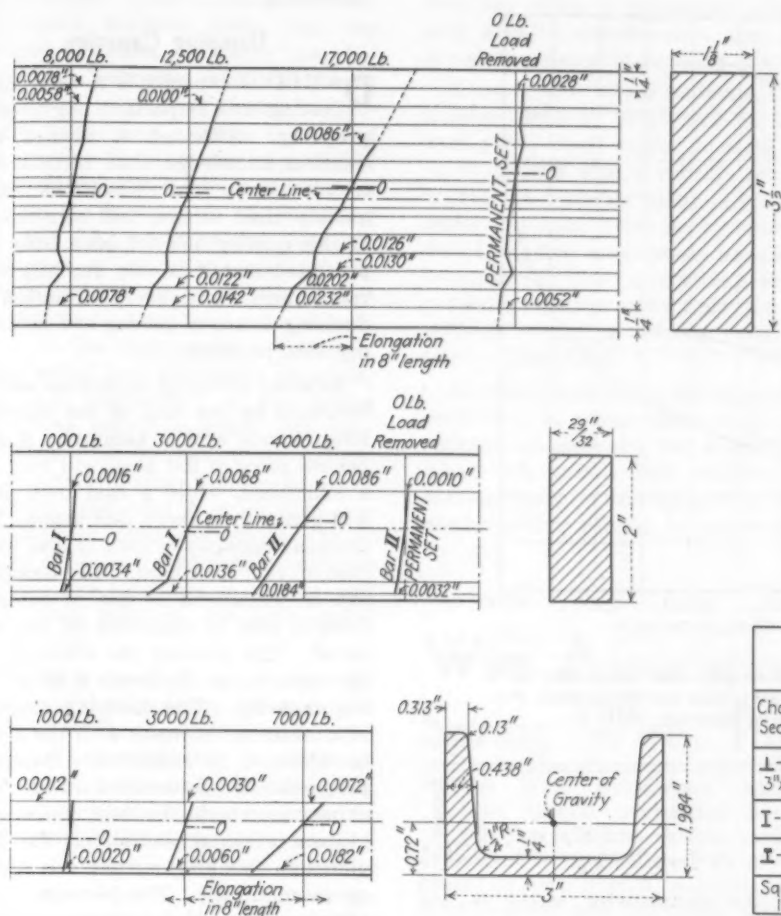


Fig. 3—As part of the transverse tests, the elongation of the fibers was determined for different heights of the section; and one result was a proof of the raising of the neutral axis with increased loading.

bars, while others greater strength for the square bars. Different grades of iron and different pouring methods, as well as different spans, will affect the results; however, the engineer does not need to be very much concerned about these results, since the square or round sections are hardly ever used in engineering design.

The use of the Bach formula can be recommended to engineers, if average conditions prevail, i.e., if the span is about 10 to 15 times the height of the section. An increase of this ratio will bring about a lowering of the modulus of rupture, while with decreasing span the modulus of rupture increases.

### Fatigue Strength

FATIGUE stresses are such as will cause failure of a structure under frequently repeated stresses very much lower than the respective ultimate static stresses. Generally, the term fluctuating stress is applied when the stresses range between a maximum and a minimum of the same kind. Repeated stress is the range of stress

from zero to a maximum, while the term reversed stresses refers to change from compression to tension. Alternating stresses are reversed stresses of equal and opposite limits.

The study of fatigue stresses is now as important as that of the fundamental static stresses, because generally machines or structures are no longer built to last a lifetime; obsolescence overtakes these engineering structures before they are worn out. Therefore there is an increasing demand for lightness and economy in the use of materials, which, of course, necessitates the application of higher working stresses. A close analysis of all stresses becomes necessary in order to avoid failure, especially from alternating stresses.

Fatigue tests on steel have held the attention of researchers for about 30 years, and it is only in the last few years that noted investigators have also turned to cast iron. It was generally taken for granted that cast iron has little resistance against alternating stresses, and the test results were

therefore so much more startling, since they proved that fatigue characteristics of cast iron compare very favorably with those of steel. In fact, practical tests with cast iron and steel crankshafts in which the center bearing was offset 1/16 in. showed that cast iron shafts will operate several times longer than those of steel before failure occurs. In this connection it must be mentioned, however, that the modulus of elasticity for the cast iron shafts is somewhat lower than that of the steel shafts and therefore the stresses for a given deflection will be lower in cast iron than steel. Another reason for the better performance of cast iron is that it has enough plasticity to minimize stress concentrations due to sharp fillets, grooves, surface scratches, etc.

The resistance to fracture from fatigue stresses is principally dependent on the range of stress fluctuation rather than on the maximum stress. The most severe stresses are, of course, the alternating stresses or, also called, completely reversed stresses.

The endurance limit for completely

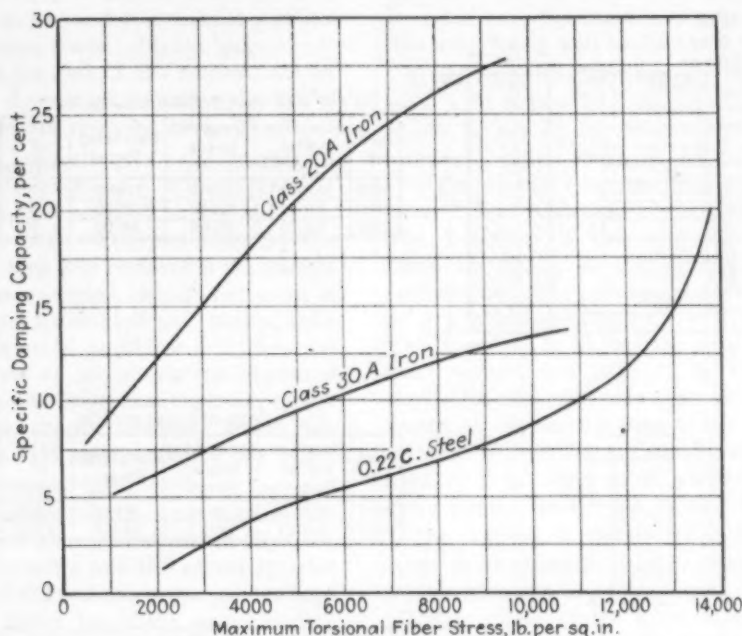


Fig. 6—Damping characteristics of two classes of gray iron ascertained on a Baldwin-Southwark tester. The curve for the steel is from von Heydekampf, Proceedings, American Society for Testing Materials, 1931.

reversed stresses for cast iron, i.e., the maximum stress value under an infinite cycle of repetition of stresses which can be sustained without failure is 42 to 45 per cent of the tensile strength for the common grades and up to 50 per cent for the high-strength irons. The endurance range, or the range of stress fluctuation, is dependent on the ratio of tensile strength to compressive strength. If compression only is applied from zero loading to a maximum, the endurance range is about six times the fatigue limit for completely reversed stresses; and if the stresses are entirely tensile, the endurance range is only one and one-half times the fatigue limit for completely reversed stresses. Tensile stresses in cast iron are most effective in reducing the endurance range.

If fatigue stresses for cast iron are not completely reversed and are either completely tensile or compressive or partly compression and partly tension, the endurance limit can be determined from equations developed by J. B. Koppers, as follows:

If  $S$  is the endurance limit for completely reversed stresses,  $r$  is the ratio of the minimum to the maximum unit stress, and  $S_{max}$  is the maximum unit stress for any cycle, then the following equation may be used, if the tensile unit stress is numerically the maximum:

$$S_{max} = \frac{3 S}{2-r} \quad (1)$$

If the compressive stress is numerically the maximum:

$$S_{max} = \frac{6 S}{1-5 r} \quad (2)$$

In the above equations, tensile stresses have the plus sign, while compressive stresses the minus sign; therefore  $r$  is a minus value when the cycle of stress is partly tensile and partly compressive. In other words, the minus sign in the denominator in both equations will change to plus if the cycle is partly compressive and partly tensile.

It is very interesting to note the comments of Koppers<sup>3</sup> and Moore on the effect of holes and grooves on the fatigue strength of cast iron. One test specimen with a radial hole of 0.055 in. diameter was tested, and whereas the mathematical stress reduction should have been 67 per cent, the actual fatigue test showed only 13 per cent reduction. Another test piece had a filleted groove, which in elastic materials should have resulted in a loss of fatigue limit of 74 per cent; the actual reduction was only 8 per cent.

The endurance limit of cast iron will be raised considerably if the material is stressed repeatedly somewhat below the endurance limit.

Temperatures up to 800 deg. F. have

practically no effect on fatigue characteristics.

### Damping Capacity

DAMPING capacity is a very interesting and important engineering property. Although it always was common knowledge that certain materials damp out vibrations more quickly than others, full significance of this quality has not been fully appreciated and it is only recently that researchers have given attention to devising means of testing and measuring this property.

Relative damping capacities are illustrated by the ring of the material when struck with a hammer. A suspended piece of flat steel will ring for a long time, while a cast iron piece will give only a short, dull sound. The damping capacity of steel is low, while that of cast iron high. The damping out of vibrations is due to internal friction and to plasticity of the material. The greater the elasticity of the material is, the lower is its damping capacity. The damping capacity of a material increases with the stress to which it is subjected. Damping properties are determined on test machines in which the test pieces are given a torsional oscillation. The free vibration damping curves are drawn up automatically. The decrease in amplitude per cycle is determined from the vibration curves and then expressed in per cent of amplitude.

Fig. 6 shows the specific damping capacities of various classes of gray iron compared with 0.22 carbon steel. In a stress range from 6000 to 8000 lb. per sq. in., Class 20 cast iron has four times the damping capacity of the steel. As the tensile strength of cast iron increases, the damping capacity decreases, but the values still remain well above those of steel.

The high damping capacity of cast iron is taken advantage of by automotive engineers in developing cast iron crankshafts and camshafts. This property is valuable in producing smooth-running engines.

In the light of recent investigations into this property it is evident that cast iron is the ideal material for high-speed machinery which is subject to vibrations. Cast iron, due to its ability to dampen out vibrations quickly, will minimize any stresses that may result from the vibrations. There is no justification for designing a crankcase, for instance, in steel plate structure in order to take advantage of a slightly greater rigidity and tensile strength of steel, since the vibrations may add up to the existing stresses in such large proportions due to lack of damping capacity that the

<sup>3</sup> Koppers, Proc. A.S.T.M. 1929, page 100.

little extra strength of steel becomes insignificant. There is danger on any high-speed machine parts that the natural vibration frequency may become into resonance with the forced vibrations originating from reciprocating forces or a rotating shaft; and the smaller the damping capacity of the materials used, the more serious will be the increase in the resulting stresses. A condition for complete resonance of vibrations may appear remote, but it must be considered that the increase in amplitude does not only occur if the frequencies are exactly alike, but if they are nearly the same, and that components of the forced vibrations may also come into synchronism with the natural vibrations. A material having a high damping capacity, like cast iron, is also less sensitive to stress-raisers—as small fillets, holes in the surface, re-entrant angles—and therefore is a safe and fool-proof material for high-speed machinery.

The high damping capacity of cast iron is bringing about some radical changes in the design of high-speed shafts, cranks and other rotating machine parts. Naturally the designer, in order to produce smoother running machinery, will of necessity proceed slowly in exploiting the high damping capacity of cast iron; however, courage is not lacking to leave the beaten path, as is exemplified by the experimentation with cast iron automobile crankshafts.

Although cast iron has generally been the material chosen for machinery bases, those of structural steel also are used, and specific damping capacity gives the answer why cast iron is superior to structural steel. Design of bases should be made with consideration of damping capacity rather than strength of the material. The weaker iron should prove even more satisfactory than the high-test variety.

#### Summary

THE study of the physical properties of cast iron reveals that cast iron is a reliable engineering material. The fact that it is less expensive than other metals does not warrant the deduction that it is inferior. Quite to the contrary, cast iron has replaced many expensive alloys, due only to outcome of service tests, which showed more favorable results for cast iron. It also is true that cast iron has failed in many instances and that other metals have been substituted instead; this, however, in most cases is either due to the fact that the parts were supplied by an unreliable source, or that the foundry was not informed as

to the service requirements. Cast iron too often is purchased without any definite specification, the price remaining the only deciding factor.

The engineer who is concerned about getting definite properties in cast-iron parts must assure himself that he is dealing with a reliable foundry source. A foundry which is ready to make anything from sashweights to diesel engines may prove unreliable, because very likely everything will be poured from the same iron mixture without regard to cooling rates and service conditions.

Another factor which has discredited cast iron in many cases is the insistence of shopmen for a cast iron which will permit high rates of machining speed; a casting having ready machinability cannot be expected to

show high strength or wear resistance. If designers desire high-strength irons, they must realize that such parts must be machined at lower speeds or with special tools. The machinability of the better grades of iron is not impaired because of hard spots, but rather because the density of the metal causes an increased resistance to tool penetration.

Some foundries are in a position to furnish medium strength iron castings with excellent machining qualities. Certain alloy additions as well as the proper control of sulphur and phosphorous will aid machinability and increase tool life. In all cases it is well to remember that the most reliable material is obtained by consultation among engineer, fabricator and founder.

## Wire Association Discusses Annealing, Spring Wire, Tinning, and Drawing

THE Wire Association held its fifth annual convention in conjunction with the various societies associated in the National Metal Congress, on Oct. 3 to 5 inclusive. The headquarters and technical sessions were at the Hotel New Yorker. Registered attendance at the sessions was about 260.

The technical sessions, as in the two previous meetings, took the form of discussions from the floor. The papers which had already been published in the official organ of the association were presented by title and summarized by the authors, after which comments arising out of the papers and out of related topics suggested by members were directed by the chairman. As this form of procedure develops it has been found in each succeeding year that the discussions tend to center more closely in the papers and related topics and to get deeper into fundamental considerations.

The steel sessions were presided over by F. A. Westphal of the Sheffield Steel Co., and chairman of the program committee, P. W. Grassell, Wilson Steel & Wire Co., and S. A. Braley of the Mellon Institute of Industrial Research. A. B. Dove's paper on corrosion and hot galvanizing brought out much discussion on matters relating to fluxes, charcoal wipes, and various welding techniques. U. C. Tamton, in a paper as yet unpublished, described a new method of continuous cleaning of wire to be galvanized. This method is based on electrolysis in a bath of molten salts of sodium.

A paper by O. S. Haskell on bright annealing in electric furnaces re-

sulted in considerable comment out of which the consensus took form that controlled atmosphere annealing approaches perfection in copper and flat steel products and in wet drawn steel wires but has to some extent disappointed its sponsors in dry drawn steel wire. The elements introduced necessarily into the chamber as components of the lubricating film carry with them enough oxygen to partially defeat the object of the close atmospheric control. It is thought that future improvement may come through the development of new lubricating methods, but the problem was admitted to be a mean one.

F. H. Nullmeyer made running comments in conjunction with an excellent new motion picture showing wire manufacturing operations at the Struthers plant of the Youngstown Sheet & Tube Co. A discussion afterward developed on the subject of heavy sully coats for welding wire and on sully coatings in general.

#### Spring Wire Reviewed

The manufacturing and properties of spring wire were summarized by E. J. P. Fisher. The subsequent discussion led rather promptly to a long harangue from the floor on the subject of inherent grain size. It was brought out that there persists in latent form through all thermal and mechanical treatments a grain size characteristic of the particular heat of steel which profoundly influences its response to various tests and service requirements. It may be compared to the influence of heredity in animate objects. It is recognizable through proper tests but is only par-

(Concluded on Page 88)

**T**HROUGH the application of metallurgy in the foundry the industry today can point to achievements undreamed of a score of years ago. Many are the metals that have found their way into our castings as an intricate and important part. Those most widely known and used being nickel and chromium. Others have come into the picture in later years, such as molybdenum, vanadium, tungsten, titanium, copper, and a few others whose effects have not yet been fully investigated.

The earliest use of alloys on record is that of S. S. Hickling, who in 1799 took out a patent for the manufacture of hollow vessels of cast iron alloys with nickel. About 2.5 to 25 per cent of nickel was used and claims were made for the rust resisting quality of the final casting.

In 1845 a patent was granted to M. S. Poole for an alloy containing 2 to 10 per cent nickel, and a high resistance to oxidation was claimed. Occasional mention of alloys being used had been made since then, but not until after the World War was any real progress recorded.

In discussing iron and steel it is becoming more and more difficult to draw the lines dividing the various types of material. Strictly speaking, iron is pure ferrite or nearly so, whereas steel is the same material laden with impurities, of which some are necessary. So called wrought iron is a very low carbon steel, and the name is erroneously used since "wrought iron" is an iron that is nearly pure ferrite containing less than 0.5 per cent of carbon. However, as this discussion deals with cast metals, a practical definition must be found for iron and steel. Therefore, according to the Encyclopedia Britannica:

"Steel is iron which is malleable in at least some one range of temperature, and also is either (a) cast into an initially malleable mass, or (b) is capable of hardening greatly by sudden cooling or (c) is both so cast and so capable of hardening. Normal or carbon steel contains between 0.30 and 2.20 per cent of carbon, enough to make it harden greatly when cooled suddenly but not enough to prevent it from being usefully malleable when hot."

"Cast Iron is, generally, iron con-

taining so much carbon, 2.20 per cent or more or its equivalent, that it is not usefully malleable at any temperature. Specifically, it is cast iron in the form of castings other than pigs, or remelted cast iron suitable for such castings as distinguished from pig iron, i.e. the molten pig iron as it issues from the blast furnace or the pigs into which it is cast."

"Malleable Cast Iron is iron which has been cast in the condition of cast iron and made malleable by subsequent treatment without fusion."

"Alloy Steels and Cast Irons are those which owe their properties chiefly to the presence of one or more elements other than carbon."

Due to the progress and metallurgical advancement in the foundry it seemed very probable that the old definitions will have to be amended or new names coined for the various new compositions or foundry products.

There are already scores of products offered the trade, both in steel and cast iron, where one or more alloys have been introduced. The resultant material has been given a trade name, patented or registered and oftentimes the firm's name is discernible. Many of the products are identical and can be duplicated by any foundry, and each can give its

# Alloys in the Ferrous Foundry

By GOTTFRID OLSON

Consultant on Iron Castings, Chicago, Ill.

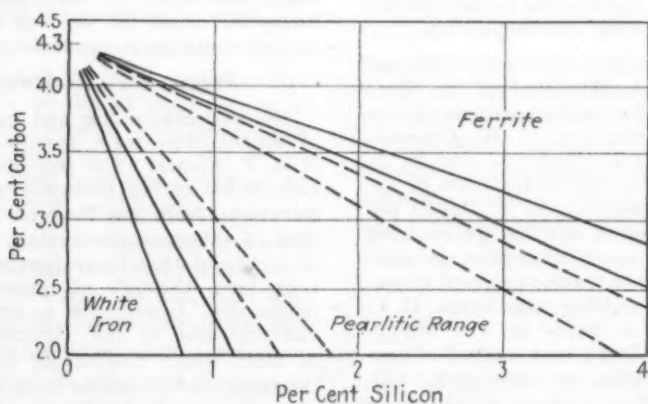


Fig. 1—Showing the pearlitic ranges in ordinary cast iron (broken lines) and cast iron containing 2 per cent nickel (full lines). These ranges are shown here as a function of the carbon and silicon contents.

THE relative complexity of cast iron as well as the various ways in which alloying elements affect the physical properties have of recent years been the subject of many papers. However, considerable confusion still exists regarding the specific advantages of various recommended mixtures and proprietary irons. This article is timely, therefore, as it concisely lists the various way in which the properties of cast iron can be modified by the addition of such elements as silicon, nickel, chromium and tungsten. The author's presentation is clear and rather complete and should help clarify the alloy question as well as show the necessity of intelligent supervision of alloying procedure in order that specific physical characteristics can be secured. The second section of this manuscript will appear next week. The author was for fifteen years superintendent of the Illinois Malleable Iron Co., after which he engaged in private practice.

product a new name. This leads to untold confusion and serves no good purpose. The buyer or user of castings is at sea with respect to the merits or demerits as the case may be of all these new materials.

At the last A.F.A. convention there was considerable discussion as to what to call a new air furnace product. Was it malleable iron or was it not? The cause of all the discussion was primarily the introduction of a small amount of chromium into regular malleable iron.

With the advent of alloys into the gray iron foundry, the condition is

getting alarming. Each foundry is pushing its own pet product under its own name. In these days of codes, a code authority for the foundry industry would not be amiss. This authority or committee would be charged with the drawing up of specifications for all casting metals such as steel, gray iron and malleable wherein alloys are introduced to improve the product. Each product could also be given an appropriate name.

### Effect of Non-Metallic Elements

The five elements carbon, silicon, manganese, phosphorus and sulphur are not considered alloys as they commonly occur in cast iron. Cast iron derives its characteristics from these elements and the product would not be cast iron without them. However, carbon and silicon play such important parts in the production of castings that some mention should be made of their influence before other alloying elements are considered.

Whatever other elements are added, carbon must be considered as it is affected in one way or another, directly or indirectly, by other elements.

For all practical purposes it may be stated that carbon exists in three forms; in white iron as cementite or iron carbide, ( $\text{Fe}_3\text{C}$ ). Cementite contains 6.67 per cent of carbon and is the hardest component in the iron carbon series. In very soft iron, most of the carbon occurs as graphite or free carbon. In most gray irons it is found as pearlite—cementite plus ferrite ( $\text{Fe}_3\text{C-Fe}$ ) with either cementite or graphite in excess. In wholly pearlitic iron there is no excess cementite or graphite.

As carbon is easily affected by other elements, either in the direction of graphitization or toward the formation of cementite, it is very necessary not only to know the total percentage of carbon in the mix but also

to know how to control the combined carbon.

Silicon may be said to work in two directions, i.e. it acts as a softener up to a certain point. At around 4 per cent, silicon has a tendency to harden and a 5 per cent it has a decided hardening effect.

As in the cast of carbon, the percentage of silicon must be taken in consideration when alloying elements are being used. Due to its graphitizing effect on carbon, silicon must of necessity enter into calculations as to whether the added alloys are in the class of carbide forming or graphite forming elements.

To quote the A.F.A. Symposium on Cast Iron, the known effects of silicon may be summarized as follows:

"1. It decreases the stability of iron carbide (cementite) thus promoting graphitization.

"2. It lowers the percentage of carbon required for the eutectic. This materially alters the 'solubility' of carbon under given conditions of temperature, etc., and has an influence on the general distribution of the structural components.

"3. The deoxidizing action of silicon probably has an indirect effect on graphitization and also may affect the fluidity of cast iron.

"4. It changes the temperature of both eutectic and eutectoid transformations, but this effect may be masked by the presence of other elements, notably manganese.

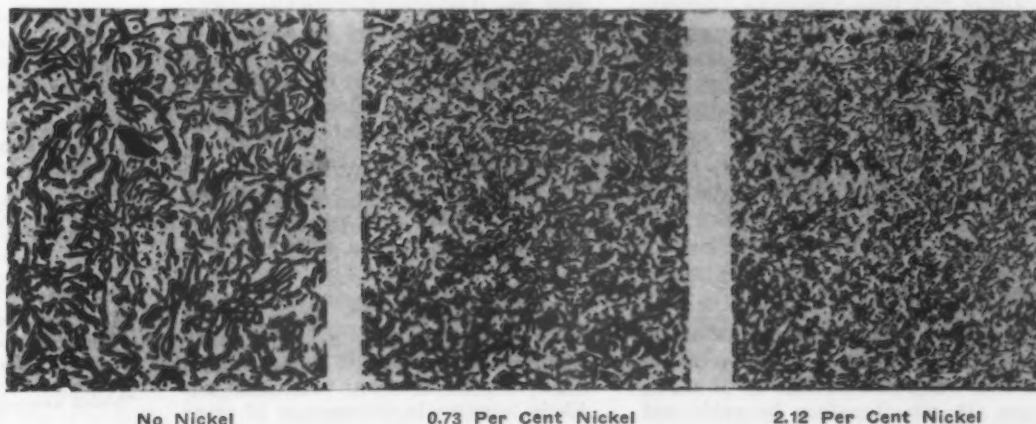
"5. It lowers the percentage of carbon for the eutectoid pearlite.

"6. In excess it produces a weak brittle matrix and practically complete graphitization."

### Influence of Nickel

As stated before nickel is the oldest known alloy in an iron base mix. A short sketch of its discovery and sub-

Fig. 2—These photos show how nickel imparts strength to gray iron by favoring smaller grain size and its effect on the graphite. Analysis of this cupola iron is 3.45 per cent carbon and 1 per cent silicon. Magnification 30 diameters.



No Nickel

0.73 Per Cent Nickel

2.12 Per Cent Nickel

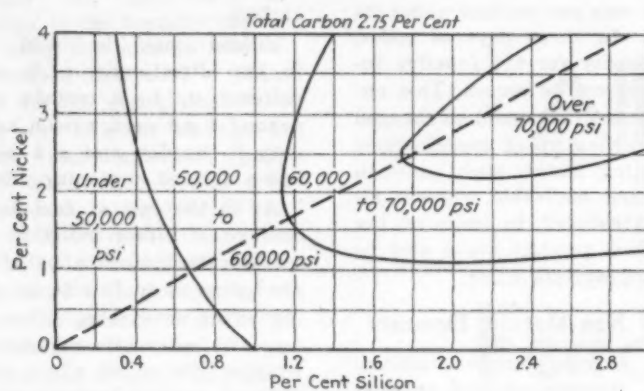


Fig. 3—How various strengths can be obtained in high-strength cast iron with various proportions of nickel and silicon. Total carbon equals 2.75 per cent.

sequent use in the industry may be of interest to the reader.

That nickel as a component part of certain articles from prehistoric times has been found to exist is proved by analysis of prehistoric weapons which show that many contain considerable nickel. This combination invariably occurs in meteoric iron from 3 per cent to as high as 26 per cent nickel.

About 235 B. C. the king of Bactria, in south east India, had coins cast of a nickel-copper composition, and some of these are still to be seen in the South Kensington Museum, London. There is no evidence of this alloy having come into use until in the seventeenth century. Copper-nickel or "Kupfernickel" was first mentioned in 1694 in the book "The Art To Discover Metals," by Hierne.

In the middle of the eighteenth century there was brought to England from China a new metal called "Pak-tong" or White Copper. This metal being produced from ore or other deposits in the interior of China was then worked into ornaments of various kinds and shipped to Europe.

Up to this time numerous attempts has been made in many parts of Europe to dissect or separate the material into its true and various constituents but always with negative result. Finally, in 1751 the Swedish physicist and metallurgist A. F. Cronstedt succeeded in isolating the new element. He named it "nickel" by reason of the difficulties experienced in obtaining it. It was also called "Old Nick's Copper."

Cronstedt's results were challenged by a number of experimenters, but in 1775 it was confirmed by T. O. Bergman. It can therefore be said that nickel as a known element has been

in existence since 1751, although it took another fifty years before a pure metal was produced.

It seems almost incredible that such a long time should pass without any effort on the part of metallurgists to make use of this element in the casting industry. As mentioned in the introduction a patent was granted in 1799 for the use of nickel in the manufacture of hollow vessels and another in 1845 for a 2 to 10 per cent nickel-iron alloy for which resistance to oxidation was claimed.

Not until 1907 was there a published report on the influence of nickel on cast iron. Guillet found that additions of nickel in relatively small proportions acted in a manner similar to silicon in promoting the formation of graphite from combined carbon. At the same time pearlite was rendered sorbitic whilst the excess cementite assumed an acicular form. With higher percentages of nickel the material consisted of austenite and graphite.

Again, very little was heard of or reported until Campion in 1918 and Smalley in 1922 made known the result of their investigations. These reports were followed by articles by Andrew and Hyman in 1924 and by Donaldson in 1925. In the latter year Wickenden and Vanick presented a paper wherein they substantiated the findings of earlier investigators.

As a result of all these investigations it is now well established that nickel may be alloyed with cast iron in all proportions. The result is a series of alloys possessing a wide and diverse range of physical, electrical and magnetic properties.

In cast iron, where variations are likely to occur in the amount of other elements present, the actual percent-

ages of nickel which are required to produce the various structures referred to above naturally depend to a large extent on the composition of the iron to which the alloying element is added. The object of using alloying elements is to improve the product or give to it certain characteristics. This, however, will not be obtained unless the base mix is of sound or proper composition.

In the cooling of gray cast iron of various sections, the thinner sections have a tendency to turn white or at any rate become hard. This may be prevented by the addition of a proper amount of nickel. It might be well to mention in this discussion that nickel is not a cure-all remedy and should not be used indiscriminately. If put in the hands of an inexperienced man it may do harm instead of good. Such a man may know that a small amount will be beneficial and then work on the principle that a double amount would be doubly so. This is very seldom the case.

For castings with normal sections the addition of 1 to 2 per cent of nickel is usually sufficient to give good machinability; upwards of 3 per cent may be used in some cases.

With nickel in this range, the carbon is finely divided thereby giving the iron a pearlitic structure. With nickel between 3 and 4 per cent the structure changes into sorbitic and at 5 to 6 per cent it becomes definitely martensitic and too hard for ordinary machining. Fig. 1 shows the pearlitic ranges of ordinary cast iron and iron containing nickel.

A nickel-iron alloy containing 4 to 5 per cent nickel is especially suited to the production of electrical resistance grids. This mix with the addition of 1 to 2 per cent of chromium makes a well balanced composition for steel mill rolls, crushers and other

TABLE I  
Hardness Tests on Alloyed and Unalloyed Irons

	Iron No. 1	Iron No. 2	Iron No. 3	Iron No. 4
Total carbon.....	3.40	3.42	3.62	3.54
Graphitic carbon..	2.95	2.90	2.82	3.54
Combined carbon..	0.45	0.52	0.80	nil
Silicon .....	2.20	2.28	1.80	2.57
Manganese .....	0.70	0.77	1.24	0.62
Phosphorus .....	0.30	0.245	0.286	0.643
Sulfur .....	0.08	0.051	0.141	0.107
Nickel .....	None	1.23	0.18	None
Chromium .....	None	0.21	0.56	None
Hardness—Rockwell "B" Scale—Average (6 to 10 readings) .....	88	93	94½	86
Brinell hardness....	174	197	199	167

castings subjected to abrasive wear. The effects of nickel may be summarized as follows:

1. Added machineability.
2. Added strength.
3. Decreased grain size.
4. Added resistance to wear.
5. Added resistance to heat (indirectly by the use of other alloys such as chromium and molybdenum).
6. Added resistance to corrosion (indirectly by the use of other alloys such as chromium, molybdenum and copper).
7. Increased hardness.

In some quarters there is a belief that in order to machine easy the iron must be soft, i.e. have a low hardness number. This idea is quite widespread although erroneous. Better machineability may be had with increased hardness and one of the functions of nickel is to accomplish this. By partially breaking up the carbides or dissolving them and at the same time refining the grain, the result is a rise to a higher hardness number. This in turn gives better machineability.

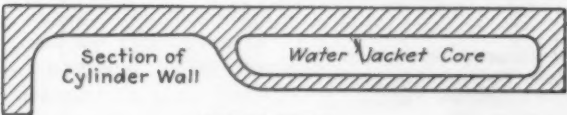
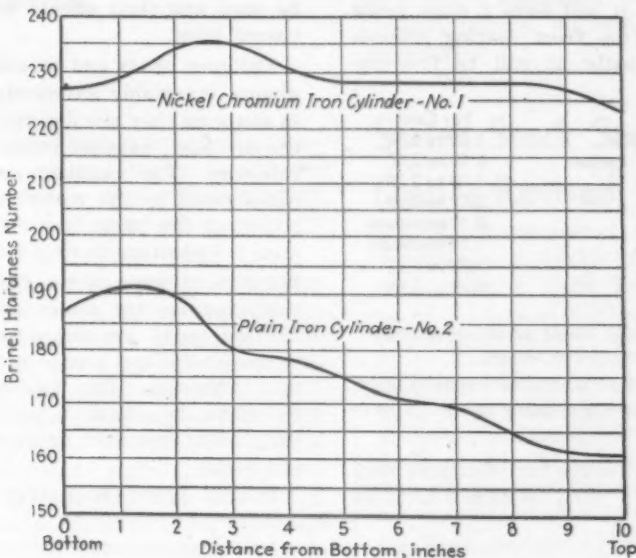
Strength is imputed in two ways; first by the tendency of nickel to favor smaller grain size and second by its effect on the graphite. This is shown by the photomicrographs in Fig. 2. How nickel and silicon affect the hardness of cast iron is shown in Fig. 3.

Closely related to the question of machineability and hardness is the question of wear. To make a readily machined casting with good wearing qualities is often a real problem. Wickenden has summed up the related attributes of machineability and wear in the following words:

"Considering the characteristic of the various constituents, a good wearing iron, but one that is machineable, has the following characteristics:

1. The presence of well distributed primary graphite.
2. A sufficient quantity of combined carbon to make the matrix largely pearlitic or, better still, sorbitic in structure.
3. The absence of free carbide and phosphide particles. When these conditions have been met, the increased hardness will indicate improved wearing properties for the increase in hardness will be produced by a change in the matrix that results from an increased quantity of pearlite or a gradual change to a sorbitic character. It will not be due to an increase in the amount of carbide spots.

The manner in which nickel insures uniform hardness is illustrated in Fig. 4, wherein is shown the results of a hardness survey along the inner walls of duplicate engine cylinders—one containing nickel, the other not. Quick cooling always tends to close the grains and to increase hardness. In this particular casting, the iron in the region of the dry sand core cools



	COMPOSITION	
	No. 1 Nickel Chromium	No. 2 Plain Iron
Combined carbon.....	0.54	0.34
Total carbon.....	2.92	3.25
Phosphorus .....	0.30	0.33
Sulphur .....	0.06	0.10
Silicon .....	2.44	2.45
Manganese .....	0.44	0.62
Nickel .....	1.31	...
Chromium .....	0.51	...

Fig. 4—Showing how nickel insures uniform hardness. This data shows a hardness survey along the inner walls of duplicate engine cylinders—one containing nickel and the other being plain iron.

more slowly and therefore lowers the hardness number as illustrated by the curve for plain iron. The effect of this in regards to wear is obvious as one end of the cylinder will wear quicker than the other. The addition of proper amounts of nickel and chromium will offset the effect of uneven cooling. From this discussion it is quite plain that nickel has a double or contradictory effect on iron; it acts as a carbide softener at the same time it hardens the matrix.

Hardening of the matrix is progressive and uniform. By gradually increasing the amount of nickel the pearlite changes into sorbite which has greater density and hardness, the two outstanding characteristics for wear resisting iron. Best physical properties of iron are found with the combined carbon around 0.80 to 0.85 per cent. When this has been obtained, the addition of nickel or nickel and chromium improves the quality progressively up to a certain point. Data to support this point is shown in Table 1. This is also supported

through investigations carried on by Huss who says:

"Throughout the investigation it was quite evident that an iron having a toughened and hardened matrix supporting the hardened and stabilized carbide was best suited to wearing service. It is well known that nickel, being soluble in iron, hardens and strengthens the ferrite matrix. Also, equally well known is the fact that chromium forms with a certain amount of iron the double carbide of iron and chromium. It is our thought (and this is substantiated by evidence presented) that it is only necessary to include enough chromium to harden and stabilize the carbide. Too much chromium is detrimental since the carbide then becomes friable, breaks up, and adds to the abrasion effect by actually furnishing more abrasives in the form of minute particles of carbide.

"From experience and test data gathered at this plant a gray iron of the following analysis will give very good resistance to the many types of

abrasion encountered, it will be strong and tough, it will have a close grain structure free from casting difficulties, and lastly, it will be free-machining.

	Per Cent
Total carbon.....	3.20 to 3.30
Combined carbon.....	0.50 to 0.60
*Silicon.....	1.60 to 2.00
Manganese.....	0.60 to 0.70
Phosphorus.....	0.30 maximum
Sulfur.....	0.10 maximum
Nickel.....	1.00 to 1.25
Chromium.....	0.25 to 0.35

\*Silicon to be varied according to cross-sectional size of the casting.

The effect of alloys to improve wear resistance is illustrated graphically in Fig. 5.

Similar evidence has been presented by Bornstein from operating tests on

although other alloying elements may be used and their effects will be discussed later.

Cylinder heads and breach ends are almost invariably extremely complex in shape as they are designed to carry the air inlet, exhaust valves and fuel injectors. The castings are further complicated by the water jacket surrounding the parts liable to reach a high temperature during service. The physical stresses these castings are subjected to are many and varied. Certain parts are subjected to high temperatures and also to repeated impact stresses. The castings must, therefore, be sound to withstand the very high pressures developed under operation.

It has been the author's experi-

strength, wear, heat or corrosion are factors to contend with, a nickel-chromium iron has been found to solve the problem. The analysis given above is not to be considered a cure-all recipe; it is merely an indication of the type of iron that should be looked for.

A discussion of the effects of chromium, tungsten, molybdenum, and other elements will follow in Part II, next week.

## British Steel Output Higher in September

LONDON, Oct. 16 (By Cable).—Production of steel ingots in Great Britain rose to 734,700 tons in September from 667,000 tons in August, despite the fact that September had two less working days. In September, 1933, ingot production was 669,000 tons.

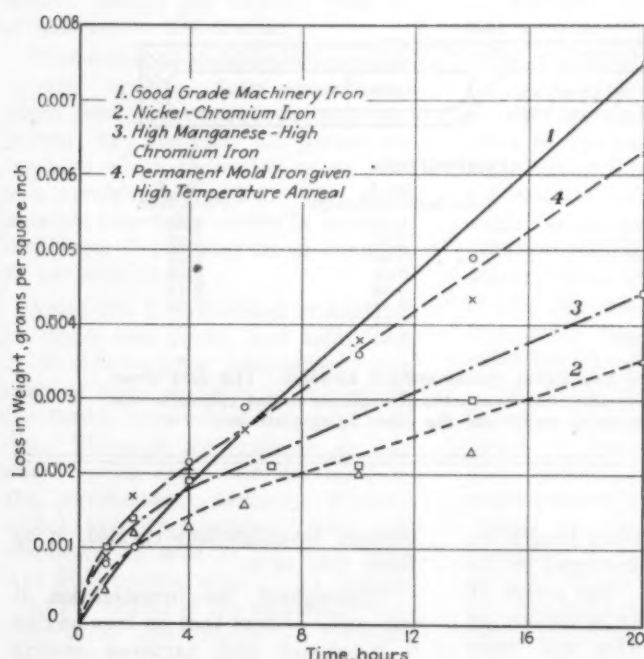
In the first nine months of 1934 British steel output was 6,622,400 tons, compared with 4,970,600 tons in the corresponding period last year and with 7,002,800 tons in all of 1933.

British pig iron production declined slightly last month, having been 500,300 tons, compared with 503,300 tons in August and with 359,700 tons in September, 1933.

In the first nine months of 1934 pig iron production was 4,432,000 tons as against 2,965,400 tons in the first nine months of last year and 3,931,700 tons in the full year.

Monthly production of pig iron and steel ingots in Great Britain during 1933 and the first nine months of 1934 was as follows:

1933	Pig Iron	Steel Ingots
Jan. ....	286,600	444,400
Feb. ....	270,800	482,700
March ....	332,200	577,700
April ....	324,700	509,600
May ....	339,900	599,600
June ....	345,600	568,800
July ....	343,900	567,500
Aug. ....	362,700	551,300
Sept. ....	359,700	669,000
Nine months, 1933 .....	2,965,400	4,970,600
Oct. ....	373,300	668,300
Nov. ....	374,900	695,000
Dec. ....	409,300	668,900
	4,123,600	7,002,800
1934		
Jan. ....	441,300	711,000
Feb. ....	414,400	707,500
March ....	503,600	829,700
April ....	496,300	716,800
May ....	529,900	780,000
June ....	515,700	757,500
July ....	527,200	718,200
Aug. ....	503,300	667,000
Sept. ....	500,300	734,700
Nine months, 1934 .....	4,432,000	6,622,400



tractor engine cylinders. Nickel-chromium alloy iron cylinders containing 0.68 per cent of nickel and 0.22 per cent of chromium were 26 points higher in Brinell hardness and showed only 68 per cent of the wear of plain cast iron cylinders.

In discussing iron for cylinders the question of heat and heat resisting iron enters in. Not only are such qualities as strength and resistance to wear of importance but resistance to growth is no less important. Growth being caused by heat it is necessary in the construction of engines to use an iron that possesses the greatest resistance to growth. Such iron is a properly balanced alloy iron. Nickel-chromium iron is the most popular and most widely used,

ence that no type of casting can give more trouble than cylinder heads. This is caused by leaks due to the uneven sections as well as trouble encountered due to growth of the castings. A pearlitic iron, low in total carbon and alloyed with nickel and chromium, was found to be particularly well suited. The analysis of this iron is:

	Per Cent
Total carbon.....	2.92
Combined carbon.....	0.83
Silicon.....	1.68
Manganese.....	0.76
Phosphorus.....	0.24
Sulphur.....	0.11
Nickel.....	1.45
Chromium.....	0.47

This type of iron has found its way into many fields. Where

# Photoelastic Study Facilitates Designing Large Casting

RECENT published examples of scientific procedure in designing large machinery members have alluded for the most part to redesign for welding. Use of such methods in casting design, including photoelastic study of stress distribution, is shown in the following brief account of the procedure by engineers of the Baldwin-Southwark Corp., Philadelphia, in designing a yoke for use in connection with a very large and heavy bending roll.

This casting was to be made of high-tensile electric-furnace steel and was to weigh about 11,000 lb. It was to be designed to resist normally direct loads up to 1,650,000 lb., and possibly to resist more than twice this load, while being subjected at times to a side load of much smaller magnitude producing a transverse bending in a vertical plane.

The shape of this part together with the manner of loading made analytical investigation difficult, if not impossible. The engineers decided, therefore, to make a scale model in steel plate, following the well-known laws

of similitude, load it in a testing machine and measure strains, and, therefore, stresses, with Huggenberger tensometers. The set-up is shown in Fig. 1.

This method was not entirely satisfactory, however, as some of the results did not seem consistent with others. It was suspected that stress changes were rapid, and the fact that the tensometers had a minimum gage length of 1 in. made it impossible to detect the sharp stress gradients suspected to exist. It was determined, therefore, to investigate the stress distribution by the photoelastic method. As no photoelastic outfit was conveniently available it was decided to build one and conduct the investigation entirely under the supervision of the company's engineers. Since the primary desideratum was the detection of dangerous stress concentration, if any, and not a quantitative analysis, the problem was relatively simple.

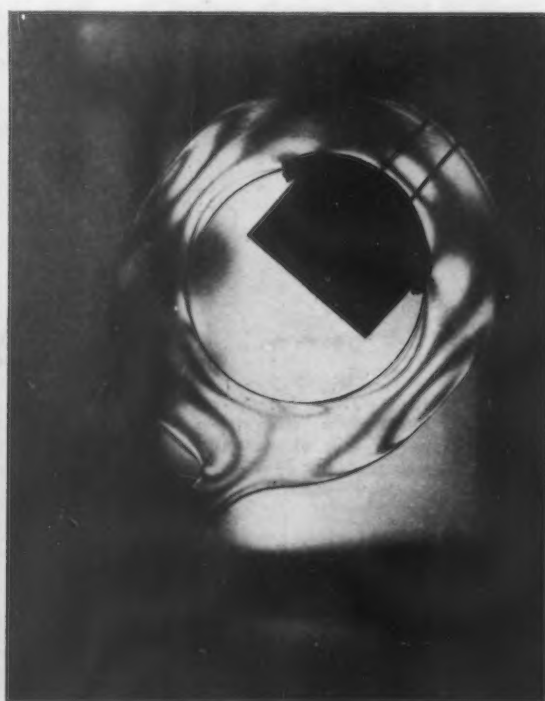
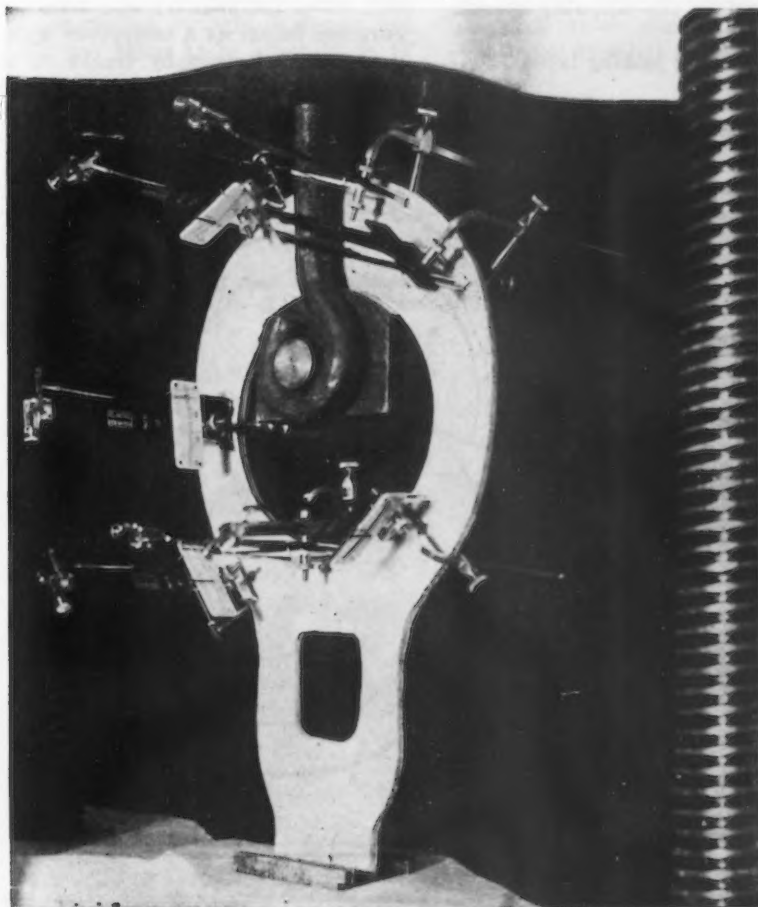
A view of the stressed model, in panchromatic polarized light, is shown in Fig. 2. As no dangerous stress concentration was pres-

ent, the part was constructed with a reasonable assurance that, given a normal casting, no field failure was probable.

## Spring Stock Strength Figures Revised

TENSILE figures of the phosphor bronze and nickel silver spring stock given in Table 2 of the article on "A Review of Spring Wire Characteristics," by C. T. Eakin, Westinghouse Electric & Mfg. Co., in THE IRON AGE of Aug. 16, page 18, are for strip stock rather than for wire cold drawn from annealed bars, as stated in the table. In the following table Mr. Eakin gives the strength values of phosphor bronze and nickel silver specimens manufactured by the same method as the other items in the original table, namely, cold-drawn from annealed bars.

Spring Wire	Composition, Per Cent	Tensile Strength, Lb. per Sq. In.	Elastic Limit (Johnson Method)
Phosphor bronze	Copper 95 Tin 5	130,000	90,000
Phosphor bronze	Copper 92 Tin 8	140,000	95,000
Nickel silver (German silver)	Copper 55 Nickel 18 Zinc 27	140,000	100,000



AT LEFT

FIG. 1—Scale model of bending roll yoke casting with Huggenberger tensometers in position.

ABOVE

FIG. 2—Stressed model of yoke casting viewed in polarized light. No dangerous stress concentrations are present.

# The Case for the Small

WHILE the small cupola is winning a place in foundry equipment because of its utility in the pouring of special alloy irons, it has also proved its worth when emergency demands for castings occur. The author describes a

number of such happenings. One case was a hurry call to replace an odd-shaped broken fitting in a municipal water supply system. In dwelling on this, he covers in some detail the molding procedure in making the new part.

A SUBSTANTIAL argument in favor of the addition of a small cupola to the battery of larger ones usually installed in the general jobbing foundry lies in the increasing popularity of special alloys. For their correct manipulation a separate melting unit is advisable, if only to prevent the contamination of the mixture by those charges preceding or following different analyses. A couple of hundred pounds overlap in a ton of metal may sound very small to a foundryman of casual tendencies,

but to the discriminating customer the test bar tells the story.

There is another powerful factor, also, in favor of the "baby" cupola, which is highly important, and that is, the ability to cast a rush job at any time outside of regular hours, without interfering with the shop's daily schedule. The man who is favored with auxiliary equipment which enables him to do this is indeed blessed, as the following specific instances show.

An ideal heavy jobbing layout, con-

sisting of a battery of three cupolas, with diameters (inside linings) of 48 in., 36 in. and a baby of 24 in., respectively, is shown at Fig. 1, in a plant where the very wide range of work turned out included castings of any description from a few ounces to 25 tons each in weight. A fair proportion of the output was taken by several local shipyards, some of it for new construction, and much for rush repairs.

This meant that the foundry equipment must be of such a nature as to enable jobs to be turned out at short notice, either from a complete or skeleton pattern, or, when design permitted, a spindle and sweep.

A sudden break in the city's water supply intake rendered part of the pumping system useless, and left the "elite" section of the population, spread over a mountain side, high and dry, water for culinary and drinking purposes being, as a temporary measure, supplied daily by trucks on a

FIG. 1—Three battery cupola layout with charging platform; 5 tons of material are always ready for 24-in. stack at right.

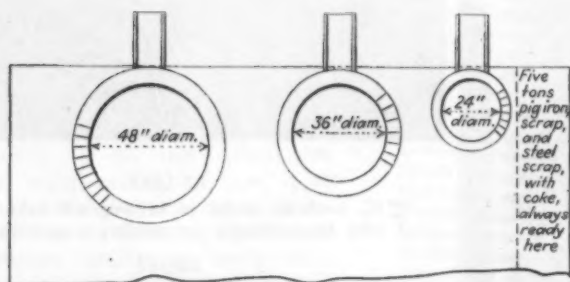
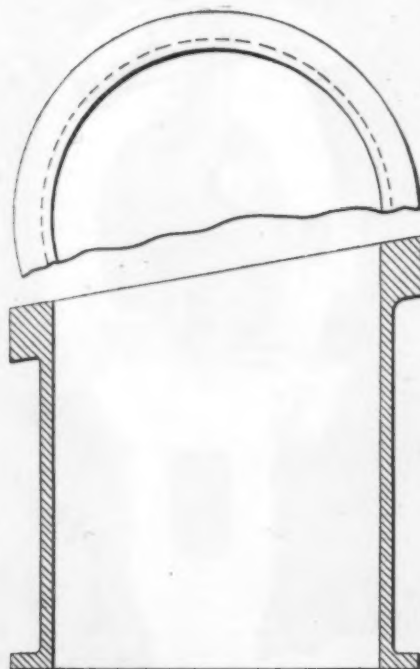


FIG. 2—Pipe casting with 36-in. diameter offset flange.



# Emergency Cupola

By J. H. EASTHAM

house-to-house basis in the district affected; the business section and remaining residences downtown, untouched by the break, carried on as usual.

Naturally, as soon as some of the uptown residents became in danger of joining the great unbathed, letters to the editors of morning and evening papers were forthcoming, couched in the usual terms: "disgraceful state of affairs"—"gross inefficiency on part of city engineering department"—"health department should institute probe," etc., etc., till that harassed servant of the public, the city engineer—a gentleman from the ground up—finally got his bearings, and appeared in the foundry office on a Thursday morning, ready to order the last casting required on the repairs.

This was a filler pipe 36 in. in diameter, 1½ in. thick in the body of the casting, straight in design, but with one flange to be offset 10 or 12

deg. from the rectangular flange at the other end, and "exact length and pitch are beyond determination until we get the rest of it into position, and are able to fit a wooden template into the gap, which will be about next Tuesday." Then came the inevitable question, "Will you require a pattern?" and, on being answered in the negative, "but how will you mold it?" and on being told the shop's propeller molding equipment would be brought into use in order to sweep up the mold and core, he shook his head, mystified, but settled down to work out a rough sketch which allowed a minimum length of 2 ft. 9 in. from the inside of the upper or offset flange (as molded) to the outside of lower flange; the upper flange to be tilted at an angle of 10 deg. in the form of an extended head 9 in. high.

This arrangement allowed plenty of latitude for the slight alteration of pitch which might and did arise, the excess metal to be taken off with

a parting tool in the machine shop and the bolt holes bored to the template specifications.

The casting as it was to be taken from the mold is shown in plan and section at Fig. 2. On being assured that the casting would be poured on the following Sunday at high noon or thereabouts, cleaned on the Monday, and placed in the machine shop on Tuesday morning by 10 o'clock, our visitor departed, in a dazed condition, but evidently hoping his ears had not deceived him.

Following his departure, a circular bottom plate approximately 7 ft. in diameter was selected from the shop's permanent loam molding equipment. This, with a spindle socket casting bolted to its lower side, was lowered level on three stools. A single course of bricks, stuffed with fine cinders between their joints, was then laid over a 2 ft. 6 in. radius from the center; a second course of bricks, mud stuffed at the joints, laid over the

FIG. 3—Building rings are overlapped to increase strength of the green mold.

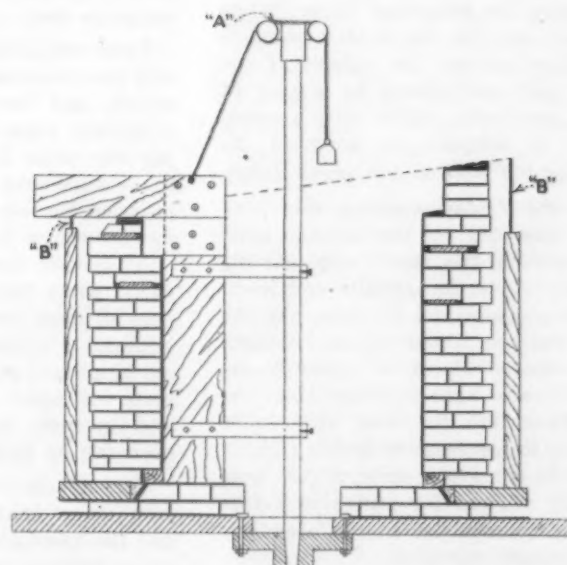
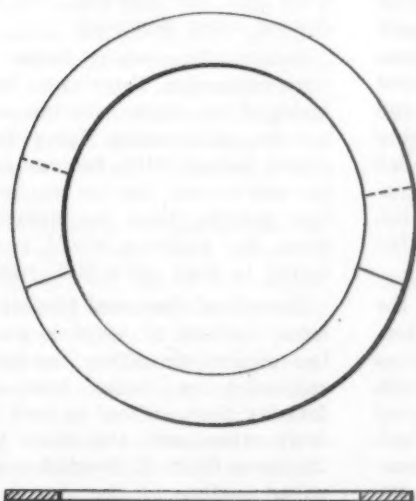
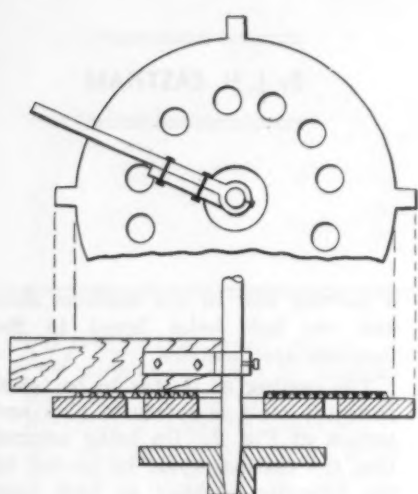


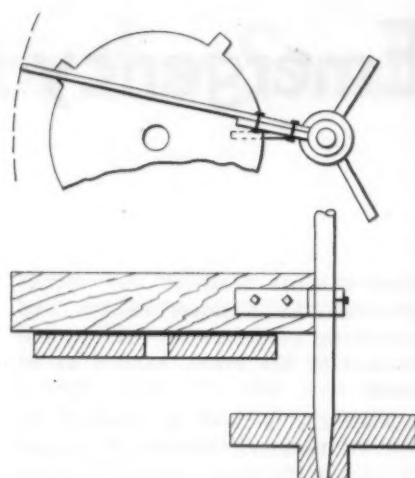
FIG. 4—Cheek mold swept-up, showing pulley and weight arrangement at A and template to determine pitch at B.



AT LEFT  
FIG. 5—Crown plate swept  
up from center spindle.



AT RIGHT  
FIG. 6—Crown plate swept  
up from spindle at side.



first, and a "step" parting in loam swept up in accordance with regular practice, and left temporarily to stiffen.

On the same day—Thursday—a cheek ring 5 ft. 8 in. outside diameter, with an inside opening of 4 ft. 1 in., and equipped with the usual lifting lugs, was molded and cast in open sand approximately 3 in. thick, also a crown plate covered with half inch "dabbers" and perforated with suitable holes for gates, risers, and center vent outlet.

During this time, the pattern shop staff cut out on a band saw 12 radial segments to form the lower flange, prepared the body and upper flange sweeps, and also the square frame to be placed around the outside of the mold, and surmounted by a ring of  $\frac{1}{8}$ -in. sheet steel, cut to form a sweep guide or template in order to determine the pitch of the upper flange.

On the Friday morning, the cheek ring was laid on the bottom plate surrounding the taper step parting already made, the spindle and lower flange segments set to place, and the mold built up almost to the low level at the under side of the upper flange, semicircular light building rings being built into the wall at suitable heights to increase the mold's rigidity while in the green state, as the time usually allowed for stiffening before placing loam molds in the oven was of necessity curtailed.

To assist in binding the brickwork, the building rings were each made a few degrees past the half circle in size, overlapping each other about a foot at each end, when placed a brick thickness apart in height, as indi-

cated in Fig. 3. Up to this point the body sweep had been secured to the spindle in the usual way by means of a set screw in each of the metal arms, but, on the square frame and sheet metal template being placed outside the wall, the set screws were removed to allow the sweep, with its flange and joint extension just added, freedom to move vertically as well as in a circular direction, as in propeller practice. The familiar balance weight with a cord passed from the sweep over a pulley arrangement at the top of the spindle eased the strain on the molder's arms to some extent when pulling the board round. These details are clarified in the view of the swept up cheek mold in Fig. 4.

Upon completion of the cheek building, the sweep and spindle were removed, and the joint trued up with a straight edge, a neat fit when closing the mold finally being of more importance than extreme accuracy of pitch on the outer face of the upper flange, as the final machining operations control that detail. Drag and cheek parts together were now run into an oven for 2 hr. and on being stiffened by that time were pulled out again and separated. The bottom plate was again lowered to the stools, and the cheek mold put back into the oven for its final drying.

The spindle was now replaced, the core sweep board bolted to position, and the same program carried out as when building the outer mold, with the exception that a vertical row of mud bricks was built into the high side of the wall to facilitate contraction and to minimize the risk of the casting cracking. Fig. 5 illustrates the method employed to sweep up the

crown plate, the spindle set central; while Fig. 6 shows a means of accomplishing the same end, when conditions do not allow a central set-up. In this case the spindle socket is placed on one side, and a longer strickle employed. Another method, usual when lining up square or oblong plates, is to level two straight edges at a given distance apart, lay the plate between them, with its dabber spikes a fraction of an inch below their upper faces, spread the loam, and strike off by means of a third parallel strip.

The operations just described were concluded by midnight on Friday, the oven kept closed from that time until 5 o'clock on Sunday morning. At that hour the staff detailed to close and prepare the mold for casting opened the oven and unloaded the car, one molder blackwashing the cheek, while the other attended to the core and crown plate. The hot molds quickly dried out the blacking, no further stoving being necessary.

Incidentally, while these things were happening, there came from the inside of the cheek mold the sound of a voice, mistreating Harry Lauder's classic ballad, "It's far tae early in the mor-r-r-nin' for tae wauken me"; but, judging from the audible comment, the audience would have preferred to hear John McCormick.

Instead of the usual binding equipment, 10 tons of weights, placed on two girders straddling the mold and supported on flasks laid on the foundry floor, sufficed to hold the job down when cast, the space between the lower faces of the girders and the upper surface of the sloping crown plate being packed up and tightened by steel wedges after the trench be-

tween the curbing and brickwork was rammed up solidly. This was considered advisable in order to save time when stripping the heavy flange extension after pouring, so as to minimize the risk of the casting cracking while cooling.

Views of the closed mold with gates and the single feeding head are shown at Fig. 7. At 8.30 in the morning the small cupola (24 in. diameter), was lit up, charged at 9.45, with 4000 lb. of a semi-steel mixture suitable for a heavy duty pipe, and the blast put on at 10 o'clock. The casting was poured shortly after 11. Feeding through the single riser, placed as close to the highest point as the gates permitted, was kept up till the casting would take no more metal.

Weights, girders, and packing removed, the gates and riser heads were broken off, the loam round the necks slackened, and, after a decent interval, the crown plate hoisted away, and the heavy flange bared inside and out for reasons previously stated. Over and above the 3200 lb. of metal used to pour the piece, and after deducting the usual percentage of melting loss, the odd 400 lb. of excess metal cast a couple of small jobs made on Saturday and left over till Sunday for the purpose.

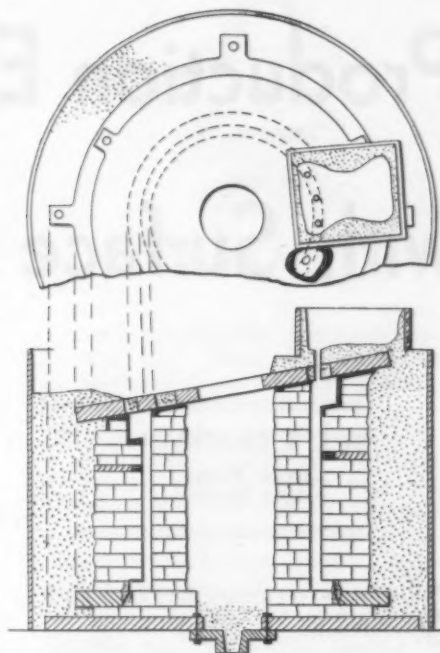
Monday morning the mold was dismantled, the casting allowed to cool till evening, chipped during the night, and early on Tuesday morning handed over to the tender mercies of the presiding genius in the machine shop.

### Story of the Transatlantic Liners

Two of those last minute events which occur in the best regulated shipyards, and almost identical in nature, caused mild flurries in a prominent shipbuilder's foundry in the space of three weeks. The melting equipment in this shop consisted of a large cupola, equipped with a forehearth, and sadly overworked in good business times; and a small emergency stack lined to 18 in., which was a great joke when viewed by strangers, but to its owners, of priceless value.

A new steamer intended for the transatlantic service had, over the measured mile off Skelmorlie, proved satisfactory on her trial runs in every respect, and returned to her berth in the Clyde to load cargo and supplies preparatory to starting on her maiden voyage to New York on a Tuesday morning at 9 o'clock, with a heavy passenger list. On the Saturday morning before sailing, while stores of all descriptions were being put aboard, most of the ship was sud-

FIG. 7—Finished offset pipe molded in loam, showing gate and riser arrangement.



denly plunged into darkness, a main dynamo pillow block bearing casting being discovered broken across. It looked like wilful damage, but there was no time for investigation, that casting had to be molded, cast, machined, and fitted to place during the week end, if the boat were to leave on schedule, and for a new ship to be detained on her first voyage is unthinkable.

Just as the last drop of metal had been tapped from the forehearth, and as the hands were lining up for their pay, a truck drove into the foundry yard, and the two pieces of the broken casting, thickly coated with engine room grease, were thrown down into the yard mud. The terse message handed to the foundry foreman read: "Increase thickness for machinery; cast today without fail." The original pattern was 200 miles away, at the dynamo maker's plant.

So then began the delightful task of burning all the oil off the broken pieces, over an open fire, then plunging them into water to cool them, wiping them dry, and selecting suitable lagging strips to fit the surfaces to be machined, before the actual molding could be begun. About the same time a sand bottom was put into the 18-in. "baby" cupola, the fire lit, and the breast made up, ready for the 400-lb. charge to be melted. Luckily, no cores were required, save those to form the four bolt holes, which were, of course, ready in stock.

When, after lifting off the cope

flask, part of the joint at each side was dug away at four places, so that the fingers could be passed underneath to remove the pseudo pattern from the sand, and the lagging strips had been drawn out, that drag part mold looked like nothing ever before designed. Still, it was finished nicely, closed and poured by 3.30 p. m. and the casting delivered to the machine shop by 8 p. m.

Remarkably, almost the same thing happened three weeks later, when, aboard one of the same company's freighters, a 4-in. three-way valve cracked behind one of the flange fillets, two hours before sailing time on Saturday. It was, of course, impossible to replace the valve in that time, as the cores were to be made and dried, mold to be prepared, the casting cleaned, machined, and tested, so the ship went down the Clyde on her way to the Orient with one of her boilers cold. The small stack was again brought into action, and the valve cast at 11 o'clock the same night; machined, and sent by train the length of Great Britain, by boat across the channel, and overland to Marseilles, to be picked up there by the boat on her arrival, and installed by the engine room staff on the run along the Mediterranean to Port Said.

Instances could be multiplied, but the foregoing cases prove that, in jobbing practice, at least, the small auxiliary melting unit, as part of a policy of preparedness, is an excellent investment.

# Production Experience with Surface Broaching

By E. S. CHAPMAN

Chrysler Motors  
Amplex Division

**S**URFACE broaching has been discussed on previous occasions in various sections of your society, and sufficient understanding of the theory and engineering aspects is now general. I therefore thought it would be more interesting to look at some actual production experiences we have been through in the past few months with a considerable number of installations of surface broaching equipment which include the simple, single stroke type of machine, the duplex type based on two broaches working alternately in the same machine, machines carrying two or more broaches, all of which act together on each stroke, and continuous rotary machines where no time is lost in handling the work.

The shape of the piece, the number and location of surfaces to be machined, and required hourly production, all affect the selection of the most suitable type of equipment.

The first piece to be considered (Fig. 1) is a steel yoke, of which the required production is very high:

**Material**—Heat treated forging.  
**Analysis**—SAE No. 3135. Heat treatment—1550°F. Oil quench. Draw to 3.8-4.0 Brinell. Forging weight, 2½ lb.

**Description**—Stem approximately 3 in. long and 1 in. in diameter and 2 fork or yoke arms approximately 2 in.

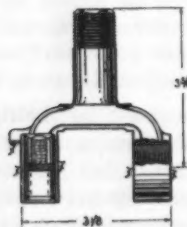


FIG. 1.

long, which end in flat bosses or knobs. The stem is turned and ground and the flat bosses are broached and drilled through.

**Condition**—Forgings are made with the die split in the center. This allows some mismatching and shifting of forgings and also some flash completely around the yoke on the center line.

**Operation**—The broaching operating locates and smooths the stock of the four faces on the flat bosses in relation to the turned and ground stem. Also, a stop lug is finished which must be in relation to the turned shoulder. It can be seen that finishing four such faces allows a chance for one or more faces to have excessive stock while all four faces have the die draft and flash.

**Limits**—Thickness of bosses, .743/.757 ± .007 in.

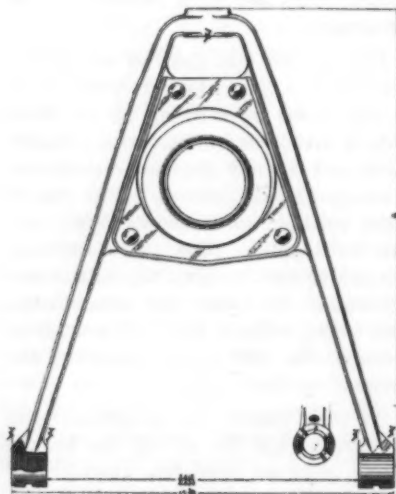


FIG. 2.

**Stock Removed**—From 3/32 to ¼-in. stock is broached off each of the four faces 1½ in. in diameter.

**Equipment:**

**Machine**—Continuous Rotary Broaching Machine—gear driven. Two machines on job requiring approximately 7 ft. square floor space each. They are equipped with a rotary

THIS paper was presented last week at the production meeting of the Society of Automotive Engineers, held at the Book-Cadillac Hotel, Detroit.

table approximately 4 ft. in diameter, rotating at 42 revolutions per hour. The table carries eight work-holding fixtures. The broaches are fastened into holders at four fixed positions around the table. The fourth and last position is merely a shaving operation to smooth the faces.

**Fixture**—The part comes to the broach with the stem and shoulder turned and ground. The part is located in a hardened bushing against the shoulder, thus assuring uniform depth of stop lug. Part is

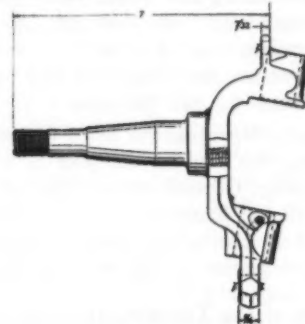


FIG. 3.

hand clamped back against two narrow drivers, one driver behind each boss.

**Broach**—Broach details are as follows: Station 1, 2 and 3, four broaches each, or 12 in all. Station 4—Shaving—three broaches making a total of 15—details per set. These broach details are made of H.S. steel. Teeth are radially cut and the rough milling of the teeth is allowed to extend back of the cutting portion so as to allow the flow of coolant to wash through the teeth and remove chips. Details are approximately 1 in. thick when new and 8 in. long and 5 in. wide. They are set up after sharpening in interchangeable holders so that a number two position, for example, can be changed on the job without resetting either of the other positions. The first 12 teeth taper .006 per tooth on the first or roughing position only. The balance of station one and all of stations two and three have a uniform tooth taper of .0021 per tooth.

The shaving position has 22 teeth, the first 9 tapering uniformly at .0005 per tooth and the balance straight. Broach speed is 8 ft. per minute.

**Operation**—Broach holders and broaches are stationary. Coolant is pumped through holes in broach holders directly into the broaches. Pieces are unloaded and loaded while table is in motion, thus allowing continuous operation. Production: 300 parts per hour per machine.

**Broach Cost**—At the end of the period covered by this study, the broach cost per piece was averaging \$.0036. A good production milling machine set-up was also in use during a large portion of this period and, for purposes of comparison, the milling cutter cost per piece was \$.0128. This broach cost is a very marked decrease from our experience during the first few weeks of the job, as this was the first installation of its kind and a great deal had to be learned from experience about the

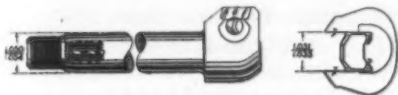


FIG. 4.

proper steps between the broach teeth, the disposal of chips and coolant, and the details of the holding fixtures to resist the very heavy and varying pressures of the cut. The broach life in this instance varies from .0625 in. to .125 in. for the different position, and an average of about 5000 pieces per grind is accomplished. Two broaching operations are performed on the wishbone shaped forging we call the front wheel control arm, shown in Fig. 2.

**Material**—Heat treated forging. Analysis—SAE No. 3135. Heat treatment—1550°F. Oil quench. Draw to 3.8-4.00 Brinell. Forging weight—14 lb.

**Description**—Wishbone shaped forging having legs approximately 20 in. long. One boss is in center of piece and one boss at end of each leg.

**Condition**—Forgings are made with the die split in the center. This allows some mismatching and shifting of forgings and also flash completely around the center line.

**First Broaching Operation**—After drilling four holes in an inside flange, a steel stamping is cold riveted into place. This serves to keep the part in alignment and adds to the rigidity. The first machining operation after this assembly is to broach the four sides of the leg bosses. While broaching the boss sides, a flat slot is broached in the end of each boss for locating purposes. Considerable variation in

the amount of stock is encountered. **Limits**—Thickness of bosses—1.368/1.382 or  $\pm .007$  in. Width between bosses inside—12.618/12.642 or  $\pm .012$  in.

**Stock Removal**—From 3/32 to 1/8-in. stock is broached off each of the four faces, each 1 1/4 in. in diameter.

**Equipment:**

**Machine**—Three machines on this first broaching operation. One vertical mechanically operated broaching machine. Two 25-ton vertical hydraulic broaching machines. These

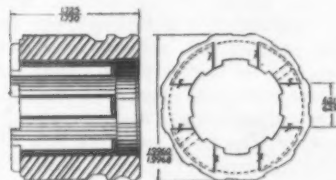


FIG. 5

are single row machines, broaching two bosses on one part at a time.

**Fixture and Operation**—Part sets in fixture locating on bosses for length. An equalizer clamps on the center boss and air clamps down on the end bosses. The fixture tilts for loading and unloading and allowing broach slide to return.

**Broach**—Broach details are 2 in. wide, 1 1/4 in. thick and 36 in. long, and made of H. S. steel. The broach speed is 44 ft. per min.

**Production**—Parts per hour—111 per machine.

**Broach Cost**—The broach cost per piece on this operation at the end of the period averaged \$.0023. The broach life was about .250 in. and about .010 in. per grind is removed with 5000 pieces produced between grindings. No fair comparison with milling cutter costs can be given on this job as the only milling set-ups in use were elementary and would not serve as a production comparison.

**Second Broaching Operation**—One of the last operations on this part is

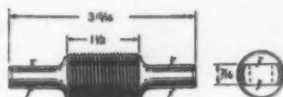


FIG. 7.

the broaching of the inside face of the center boss.

**Limits**—Width of boss, .931 in. (1.140/1.109).

**Stock Removal**—From 3/32 to 1/8-in. stock is removed from the back of the 1 13/16 diameter boss.

**Equipment:**

**Machines**—There are two 25-ton verti-

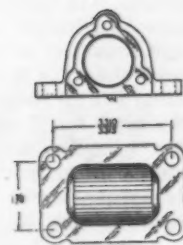


FIG. 6.

cal hydraulic broaching machines on this job. These are single ram machines, broaching one part at a time.

**Fixture**—Part sets horizontally in fixture with outside of leg bosses against side stops and cone plugs inserted in the boss holes from inside to locate for length.

**Broach**—One broach detail is required per machine. It is 46 in. long, 2 1/6 in. wide and approximately 1 1/4 in. thick, and made of H. S. steel. Broach speed is 44 ft. per min.

**Operation**—Parts per hour—111 per machine.

**Broach Cost**—The average broach cost per piece on this operation is \$.0023. The broach life is .0625 in. Fewer broaches are required per set-up than in the first operation, but the shorter total life accounts for a nearly equal broach cost per piece. This operation is a good example of the possibility of broaching surfaces almost impossible to mill on a production basis as there is insufficient room for a milling cutter or arbor and about the only alternative would be a back spot-face operation, which would be unsatisfactory. Our next part is the more familiar steering knuckle shown in Fig. 3:

**Material**—Heat treated forging. Analysis—SAE No. 3135. Heat treatment—1550°F. Oil quench. Draw to 3.8-4.0 Brinell. Forging weight—6 1/2 lb.

**Description**—Conventional type of knuckle forging.

**Condition**—Smooth surface on forging free from scale and flash and fairly uniform as to stock thickness.

**Operation**—Broaching both sides of two 1 in. diameter bosses and one side of flange 1 in. wide and 2 1/2 in. long.

**Limits**—Thickness of bosses, .555/.569  $\pm .007$ ". Location from bearing shoulder, plus or minus 1/64 in.

**Stock Removed**—3/32 in. on a side on two 1 in. diameter bosses and 1/8 in. to 3/16 in. on flange side.

**Equipment:**

**Machines**—Two vertical hydraulic double ram machines, one cutting alternately, the other simultaneously.

**Fixture**—Fixtures are stationary; so both fixtures are loaded and both knuckles are broached at the same time. Broach slide has to return to upper position before pieces are removed. Machine No. 2—Equipped with double broaches and double ram. Fixtures swing horizontally, so that idle fixture can be unloaded and loaded while ram is traveling upward.

**Broaches**—Length approximately 40 in. Width approximately  $1\frac{1}{2}$  in. Depth approximately  $1\frac{1}{2}$  in. These broaches are made up of details approximately 10 in. long. Broach speed 33 ft. per min.

**Production**—Machine No. 1, 158 per hr. Machine No. 2, 240 per hr.

**Broach Cost**—The broach cost per piece in this instance is \$.00218. A total broach life of .180 in. is available, with .010 in. taken off per grind and about 7000 pieces machined between grindings. We have a good opportunity here for direct comparison of milling and broaching as, due to the quantities required, the best of milling equipment has been in use for some time and over a similar period the milling cutter cost per piece was \$.0203, or about nine times as great as the broach cost. Our steering gear cross-shaft (Fig. 4) furnishes the next example and has the following specifications:

**Material**—Heat treated forging. Analysis—SAE No. 4130. Heat treatment 1550°F. Water quench. Draw 3.7-4.00 Brinell. Forging weight—3 lb.

**Description**—Upset forging having approximately 2 in. diameter knob on one end. This knob is slotted or indented in the forging operation.

**Condition**—Due to the location of this slot in the forging, the cold-trimming is a difficult operation; therefore, the stock to be removed by broaching varies considerably.

**Operation**—This slot must be broached smooth on the sides and a Vee-shaped clearance broached at the bottom of the slot.

**Limits**—Slot must be parallel and within .002 in. for width—1.031/1.033.

**Stock Removal**—Approximately  $\frac{3}{64}$  in. is broached from each side— $1\frac{1}{2}$  in. long and 1 in. wide.

#### Equipment:

**Machine**—One duplex vertical broach (mechanical) with two rams.

**Fixture**—Tilting type. Part locates in a bushing against a turned and ground shoulder and is located sideways by equalizing jaws on the sides of the upset head to properly divide the stock.

**Broach**—Four broaches are used per set-up, each approximately 8 in. long, making one broach 42 in. long. They are made of H. S. steel and

ground all over. The broach speed is 27 ft. per min.

**Production**—125 parts per hr.

**Broach Cost**—This type of broach has only .001 in. grinding stock on the width, but can be sharpened by grinding approximately .005 in. from the face. The available total broach life is .050 in. on the face and about 10,000 pieces are finished per grind. The average broach cost per piece in this case is \$.00125. This is a good broaching job, difficult to handle satisfactorily in any other manner, and we have had cases of broaches running over 140 hr., or about 20,000 pieces, without removal for grinding. In this case, as in all others mentioned here, it is anticipated that the broach cost per piece will decrease with experience and improving practice. The next example is a free wheeling cam (Fig. 5), somewhat different in that the piece is machined before broaching, so there is no surface scale to contend with and two operations are performed in one setting by means of an indexing fixture. The characteristics are as follows:

**Material**—Nickel - Molybdenum, Carbon .19-.23. Forged and annealed to 4.1 maximum—Brinell. Forging weight 2 lb.

**Operation**—Broach one slot across face of the part in relation to the sides of cam. Index 90° and broach another slot at right angles to the first one.

**Limits**—Width of the slot is .621/.629. Depth of slot .125-.135.

**Stock Removed**—Approximately  $\frac{5}{8}$  in. wide,  $\frac{1}{8}$  in. deep from two sides of a  $\frac{3}{8}$  wide ring.

#### Equipment:

**Machine**—One Duplex Vertical Broach (Mechanical).

**Fixture and Operation**—The piece is located in the fixture on a splined stub arbor. An air clamp pulls work into place. Broach is up. Fixture rocks in. Broach moves down. Fixture rocks out. Unload and load.

**Broach**—Each broach is made up of three details, each  $\frac{5}{8}$  in. wide,  $1\frac{1}{4}$  in. thick and 10 in. long, making a broach length of 30 in. Broach speed is 38 ft. per minute.

**Production**—127 parts per hours.

**Broach Cost**—The broaches in this case have a total life of .125 in., but .005 in. is removed per grind, making a life of 25 grindings with about 8000 pieces produced between grindings. The average broach cost per piece is very low, being \$.00057.

Our next example is a small malleable cast housing (Fig. 6), weighing about 1.8 lb. and having a flange on the bottom face:

**Description**—Outside dimensions  $2\frac{3}{4}$  in. x 4 in. with opening  $1\frac{1}{2}$  in. x

$2\frac{1}{2}$  in., giving 7 square inches of surface to be finished.

**Condition**—Some pieces have fairly hard, rough, chilled surface.

**Operation**—The broaching operation locates and smooths the bottom of the flange with relation to the previously machined sides.

**Limits**—The surface must be smooth and square and free from scratches.

**Stock Removed**—From 1/16 x 3/32.

#### Equipment:

**Machine**—One 8-ton vertical hydraulic broaching press.

**Fixture**—Fixture slides in and out to broaching position. Part locates in a box-type fixture resting on a machined surface and held by a hand operated cam clamp. Cycle: load fixture with broach up. Slide fixture forward into place. Broach moves down. Slide fixture back. Broach moves up while unloading and loading.

**Broach**—The broach is approximately  $4\frac{1}{2}$  in. wide and 30 in. long and is in one piece made of H. S. steel. Broach speed is 18 ft. per minute.

**Production**—Parts per hour, 166.

**Broach Cost**—These broaches have an available life of .050 in. and about .003 in. is removed per grind, making 16 grindings the life of the broach. Due to the wide surface being machined and the broach possibly somewhat shorter than it should be, the number of pieces between grindings is not as great as in many of our steel parts, 2500 per grind being the average, which gives an average broach cost per piece of \$.0018.

The next and final example for discussion (Fig. 7), presented an unusual problem. Four flat surfaces, two at each end, have to be held closely parallel and in plane with each other and closely parallel to the pitch line plane of the threaded center section. This part is made from bar stock of SAE No. 1335 analysis, the blank weighing about 1 lb. A very high production rate is required. There is no heat-treatment before broaching. The part is clamped between cam-operated jaws having threaded inserts that bear on the pitch diameter of the thread. Provision must also be made for accurate longitudinal location of the parts in the fixtures. This involves some skill and experience on the part of the operator before the maximum output can be reached. The piece is threaded at the center portion for approximately  $1\frac{1}{2}$  in. with  $1\frac{3}{16}$  in. at each end turned to  $1\frac{1}{8}$  in. diameter.

**Limits**—Thickness of flats—.430/.444  $\pm$  .007 in. Flats must be in same plane within .005 in. and parallel with threads within .001 per inch.

**Stock Removal**—Over 3/16 stock is removed on each side at the maximum diameter.

(Concluded on Page 90)

# Equipment Policies in View Of the Present Situation

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By J. E. PADGETT  
Spicer Mfg. Corpn.

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**F**OR presentation before the production meeting of the Society of Automotive Engineers, in Detroit, Oct. 10-11, 1934, Mr. Padgett was asked to prepare a paper on "The Effect on Product Costs Resulting from the Purchase of Replacement or Additional Equipment." He asked that he be allowed to substitute—"Machinery and Equipment Policies in View of the Present Business Situation," because, he said, "I have no idea whether any present thoughts will be worth anything a month from today."

The difficulty of foreseeing effects, under the kaleidoscopic changes of a multiplicity of bureau controls and the vagaries of procedure following "action" enactments, many of them resulting in confusion worse confounded, Mr. Padgett pointed out, merits wide and thoughtful attention in order that we may, through wise insistence, return to the main road from which we have been detoured in the orderly, even though by economic cycles, conduct of business.

"A successful business is the result of a carefully balanced grouping of the financial, engineering, sales and manufacturing operations. To be successful, none of these can be given a greater advantage at the expense of the others. As production men, we have to determine, to the best of our ability, the real needs for expenditure in the tools of manufacture, but we must be careful that money spent on such fixed assets does not rob other activities to the detriment of the entire business.

"For the last several years there has been a very decided shrinkage in working capital of most manufacturing institutions, primarily due to the extremely low operating rates effective during the depression and the resulting losses that have had to be met by cash payments that have reduced the actual working capital. This shrinkage has been intensified by a load of bad debts, shrinkage of inven-

tory values, losses from the sale of used equipment not properly depreciated and excessive overhead charges resulting from excessive or ill-advised plant, equipment, machinery and personnel. We cannot help but learn as a result of our experience in the last two years that if a business is to carry on through difficult periods, it must be free from excess fat in the way of unnecessary personnel or equipment.

"It is difficult in these trying times to use proper judgment regarding the possible obsolescence of equipment that may be desirable. Present conditions engender inventiveness on the part of machine builders to try to stimulate sales for new types of equipment where they are unable to create any volume on former standards because of the unused equipment available. Under these conditions, a machine that would seem to be a useful purchase today may become obsolete in six months because of radical changes in method developed in the meantime. This would be the normal result of the present situation. It does not work freely because of artificial restrictions, but may become effective at any time, if such restrictions are removed.

## Income Tax Possibilities

"The new income tax ruling, which changes the method of computing depreciation for income tax purposes, will probably change many former cost systems and will cause a different viewpoint when new purchases are contemplated. In brief, this new ruling requires that at the present time each machine will be checked and its probable remaining useful life in years determined, and from this number of years of future life and the actual number of years of past life a rate of depreciation will be determined, and this rate will be effective during the remaining life of the machine. I believe that this kind of a consideration

will radically change many of the past practices in the matter of machinery purchases. Statistics indicate that the vast majority of businesses have set up depreciation rates that are altogether too low to take care of normal replacement in order to inflate current operating statements. Where insufficient rates have been effective for a number of years, the new tax ruling is going to be unfortunate because the manufacturer will be unable to use the difference between his high book value on the equipment and the lower value created by the new income tax set-up as an offset in the calculations of his earnings for future income tax purposes. In general, I believe the result of this will be an increase in depreciation rates and a consequent increase in the unit value of fixed charges carried into product cost through the burden account.

"Many businesses in the past have spent money freely for new fixed equipment, when it seemed profitable, because it was easy for them to obtain additional capital from the banks in the form of loans or by the sale of securities. The present Government policies have made it practically impossible to obtain capital in either of these ways. The present requirements for the liquidity of banks and the policies governing loans and deposit insurance pretty much require that banks restrict themselves to commercial operations in which loans are made on the current movement of goods where these loans can be liquidated in thirty or sixty days, and it is very difficult for the banks to consider the tie-up of cash into long term loans on fixed assets. The newly enacted legislation governing the sale and trade of securities has practically stopped the issuance of bonds, stock, etc., and has made it almost impossible to raise additional capital in this manner.

"The operations of the NRA, the various labor boards and other govern-

mental bureaus all tend to increase the hazard of doing business, the cost of doing business and reduce the returns to the vanishing point or turn these into losses. It discourages the use of lower cost equipment, because in their view this makes fewer jobs instead of more. They seem to forget that these measures which produce high costs result in a shrinkage of purchasing power that has tremendously greater effect in the loss of jobs.

"We must remember in this discussion, that up to 1928 our industry was expanding and certain policies were best under those conditions. It has now reached a point where it will probably no longer expand and the policies must be changed accordingly in the future. It will result in much more conservative practice.

"All of this makes a very poor case for the purchase of any equipment that is not absolutely necessary. If it should work out in this way, it will be a sorry picture for the machine tool builders and eventually for the industry in general, but it seems to me that these courses are more or less inevitable if the present governmental policies continue along the present lines or along lines more radical than they have been. You men who are responsible for the earnings and welfare of thousands of workmen should study and recognize the real troubles that a continuation of present Government policies will create. You should have the greatest incentive to lead the way for the vast number of men you are responsible for, so that conditions will be made as good as possible for them

to make the greatest earnings and do the most work they can.

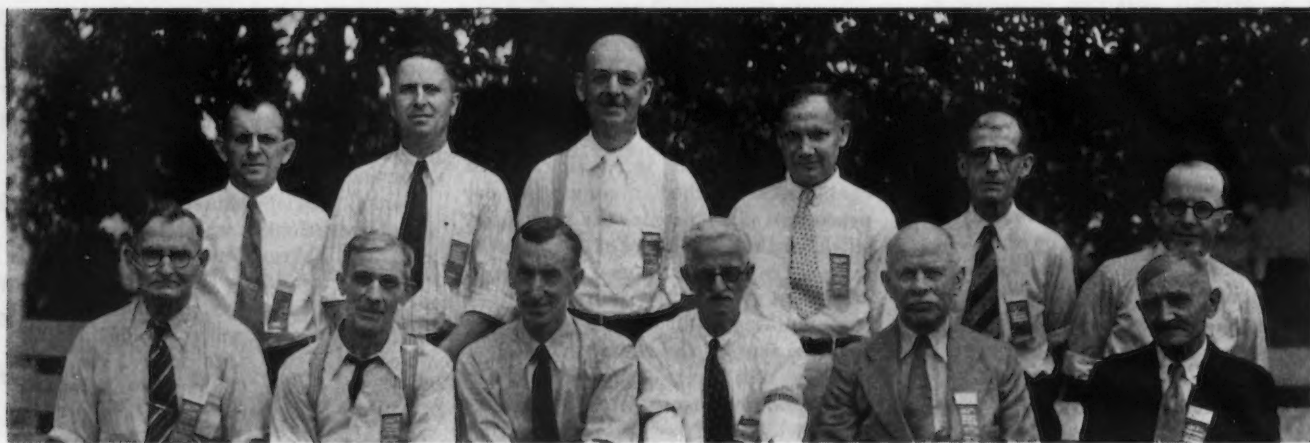
"I have brought out one side of the picture and it is not a pleasant prospect. The other side is better and I think it would be in effect if the free flow of normal forces can be allowed to operate. These changes in condition and thought go in cycles and the old expression, 'it is darkest before dawn,' usually holds. If this is true, it is probable that the conditions of today will awaken people in general to the destruction being created and will cause a reaction that will put us back on a course that will carry us into prosperous conditions again. Taxpayers in general and business in particular will soon find what it means to pay for the tremendous uncontrolled expenditures. It is probable that if the present trends continue, and the Federal budget is not properly balanced, there will come a time inevitably when the Government can no longer borrow additional huge sums freely, and in order to sustain Federal credit, it will be necessary to balance the budget and this can only be done by drastic increase in taxes. This action will have to be taken soon, and the livelihood of your business, yourself and the people who work for you, depends largely on how soon public reaction gets around to recognizing these facts and insists upon their accomplishment.

"I believe, in the matter of machinery, that, for long time planning, equipment should be purchased in the most sparing fashion when productive operations are high, and should be purchased in the greatest amounts

after passing the bottom of a depression, because these purchases will prepare the business for correct low cost, successful manufacture during the ensuing expansion, and will also take advantage of all of the developments and inventiveness that is forced out during hard times. This is probably the course that would be taken at this time by the successful future businesses if the normal, economic cycle were left to itself and this would tend to start business and prosperity on the upgrade. I believe that if we can change the Government's attitude so that it will allow the normal operation of economic law, we will rapidly get into this kind of a cycle with general good to everyone, but it will take a definite concerted action on the part of everyone, who can think clearly, to swing the trend into this proper course.

"When equipment is purchased for expansion, or to do a job that cannot be done some other way, or for reasons of quality, it is required that investments are something that are made entirely on the judgment of management. Machinery purchased to replace existing equipment on the basis of savings to be made, under ordinary conditions, should be purchased only on the basis of present quantities of product and on the labor savings alone. Burden cannot be included in these savings because a purchase of new equipment in general results in an increase in burden instead of a decrease, and this is especially true if the new equipment reduces the actual cost of labor and if the burden is figured on a percentage basis."

## Three Hundred Years of Service



**T**HAT is what these 12 men represent. They are members of the 25 year club of the Watervliet plant of Ludlum Steel Co. The picture was taken in commemoration of the 80th anniversary of the Ludlum Company, now being observed.

Left to Right—Front Row: William H. White, James Decker, Albert Doremus, James L. Black, Frank S. Quick, Oscar Hill.  
Left to Right—Rear Row: William Cherney, Anthony Passafaro, Theodore S. Robinson, John Dorman, Tito Mori, John Cherney.

## Variety of Cold Forming Jobs Done on Extrusion Press

**A** NEW extrusion press now built by the Norin Engineering Co., 355 North Union Park Court, Chicago, is adapted for performance of a variety of forming operations where it is desired to work the metal cold. Various forms of work-handling devices may be applied to this machine, according to the particular job on which it is to be used. In the machine illustrated the work consists of steel bars  $\frac{3}{4}$  in. in diameter, which have an upset flange near one end. These pieces are put indiscriminately into the hopper at the left-hand side of the machine. From this hopper the pieces run down a chute and, owing to the enlarged diameter of the flange, the large end runs more rapidly, causing each successive piece to go the same way into the transfer slide, regardless of how it was placed in the hopper.

Each time the press is tripped the transfer slide carries a piece under the extruding die, where the end is flattened and two small pilots are extruded into cavities in the die. As the ram rises, the upper die member carries the work up with it, where an automatic knockout ejects the finished piece from the die and allows it

to slide down a chute into a box placed to receive the finished parts.

The pressure exerted by this press can be regulated between zero and 100 tons. The ram is actuated by a crank and toggle mechanism. A hydraulic device regulates the tonnage according to requirements. The ram reciprocates through the crank and toggle device, but does not develop tonnage until resistance is offered to the downward stroke of the ram. This resistance builds up pressure in the hydraulic dash pot, and the amount of pressure is governed by a pressure regulating valve.

In addition to affording tonnage regulation, this device has another particularly valuable feature. Bearing in mind that tonnage is not developed until resistance is offered to the down stroke of the ram, it will be apparent that work of various sizes can be handled without the necessity of stroke adjustment. As soon as the upper die carried by the ram contacts the work, pressure begins to develop, and therefore the only adjustment for different pieces of work is to regulate the pressure regulating valve to give the necessary degree of pressure for the job. Machine is shown on page 46.

## New Housing Safeguards Electric Truck Operation

**T**HE Baker-Raulang Co., Cleveland, has brought out a new two-wheel drive, four-wheel steer, 3-ton elevating truck having a 5 $\frac{1}{2}$ -in. lift, as pictured on page 47. New streamlined housing for the battery box and controls is said to increase accessibility, to eliminate danger from protruding parts, and to provide greater safety for the operator. An electrically welded carbon steel frame, alloy steel trailing axle, larger travel brake, roller bearing steering mast, needle bearings in steering-rod connections and higher travel speeds are specified. The power axle and lift unit have been used on Baker trucks for several years. The power axle employs worm drive, 17 $\frac{1}{2}$  to 1 ratio, with hardened and ground alloy steel worm running with a bronze wheel, and a four-pinion ball bearing differential. Axle shafts are full-floating with extra-heavy universal joints inclosed in dust-proof boots.

The patented Baker duplex compensating suspension, in which the axle is suspended by torque and drive yokes, permits free motion of the axle over uneven floors without transmitting jars or shocks to the frame. Helical springs are replaced by resilient rubber piles having equal

shock-absorbing ability. Ball bearing driving wheels are mounted on drop forged knuckles. Driving tires, 20 in. by 5 in., are of the solid, pressed-on type. Roller bearing trailing wheels turn on drop forged knuckles. Tire size, 10 in. by 6 in.

The lifting unit employs roller chain and hardened steel sprockets, and embodies a combination spur gear and planetary reduction with hardened, cut-steel gears running in oil within a completely inclosed and sealed case. The unit is mounted in a high position on the platform end of the battery compartment, eliminating dirt collection. Limits of operation are protected by a limit switch interlocking with the lift controller.

The travel controller is mounted in the power compartment inclosure at the operator's end, and is so interlocked with the foot brake through a magnetic blow-out, mill-type contactor, that the circuit is opened when the brake is applied and can be closed only by returning the controller to neutral and releasing the brake. Three speeds forward and reverse are supplied; foot control in first speed in both directions is optional equipment. The controller is Baker continuous torque, metal drum type, with

extra-large contact surfaces and reversible and renewable electrolytic-copper fingers; the handle has a gate-type positive stop at neutral.

The travel and lift motors are made in the Baker plant under Baker patents; both are totally inclosed and the armature shafts turn on heavy-duty ball bearings.

All bearings are fitted with high-pressure nipples so located as to be easily reached for grease gun service. A heavy, hinged plate at the battery-box end of the platform prevents load shifting.

Standard platforms: 55 to 84 in. long, 11 in. high, giving ample clearance under 12-in. skid, 26 $\frac{1}{2}$  in. wide. Right-angle turn can be made in 68-in. intersecting aisles.

## Convenient Layout Device

**T**HE "Angle Plate and Holocator," shown on page 46, is a precision device for tool-room use, or for the accurate drilling of limited quantities for which jigs or fixtures are not available, and is manufactured by the Dayton Rogers Mfg. Co., Minneapolis, Minn. Precision gaging blocks are a part of the equipment and provide simple means for accurate location of holes. Bushing disks for a complete range of standard drill bushings are also a part of the equipment. For angle plate layout set-up, measuring, checking and inspection the new angle plate feature in combination with the use of a vernier height gage allows accurate cross-checking of all work. The illustration of device use, on page 46, shows a die-block in drilling position. The gaging blocks may be used with either English or metric systems of measurement.

## Improved Force Feed Lubricators

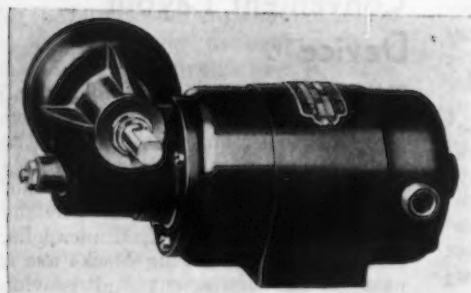
**I**N the new improved series 1000 automatic force feed lubricators, shown on page 46, announced by the Victor Lubricator Co., Chicago, cadmium plated steel replaces brass for greater tensile strength; a new sight feed, incorporated in an enlarged filler tube, covers visibility for both reservoir supply and rate of oil feed, and a new valve, housed within the filler tube, discourages tampering with original adjustment.

These new lubricators are of the previous self-contained and air-tight design. They feed the oil by pressure generated within the lubricator, where oil temperature variances, created by the needs of the bearing itself, cause expansion or contraction of the fractional cubic inch of air imprisoned near the base of the filler tube and regulate by pressure the rate of oil flow.



#### AT RIGHT

THIS layout device has a considerable range of use for both tool rooms and for such small quantity production as is not jigged for drilling operations which require a close hole-accuracy. Description is given on page 45.



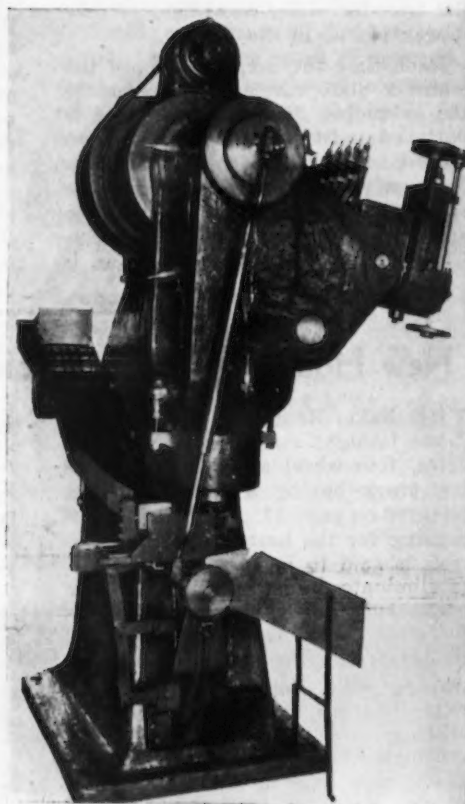
#### AT LEFT

FREQUENTLY it is desired to get angularity of drive from a take-off shaft, and to retain set position of the motor. A motor reducer unit which permits of this is described on page 48.



#### ABOVE

MOTOR protection in portable electric grinders requires air filtration by methods which will not interfere with the necessary amount of ventilation. The design through which one manufacturer aims to accomplish filtration and ventilation is described on page 48.



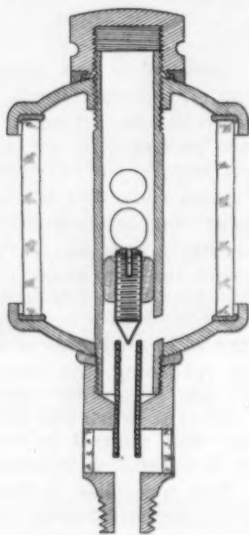
#### ABOVE

VARIOUS forms of work-handling devices provide the means for producing coldforming jobs on an extrusion press in accordance with the work requirements. Details of actual production on page 45.



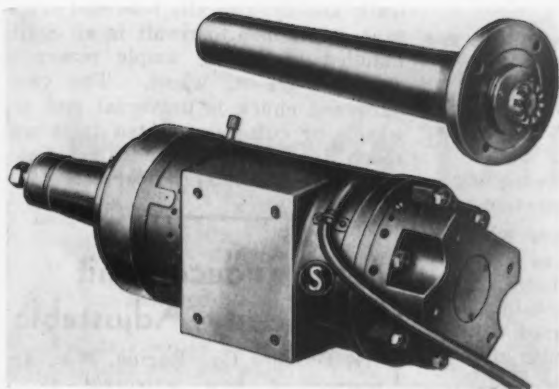
#### AT LEFT

THIS air-line strainer for pneumatic tools, Cleveland Pneumatic Tool Co., Cleveland, attaches to individual air outlets just ahead of the air hose. The removable screen serves to pocket and retain any foreign matter. The screen-opening area is six times that of the outlet. This construction is claimed to assure against any drop in pressure due to strainer use.



#### AT LEFT

THE force feeding of oil by pressure generated within a lubricator of air-tight design and embodying visibility of oil supply and rate of feed is described on page 45.



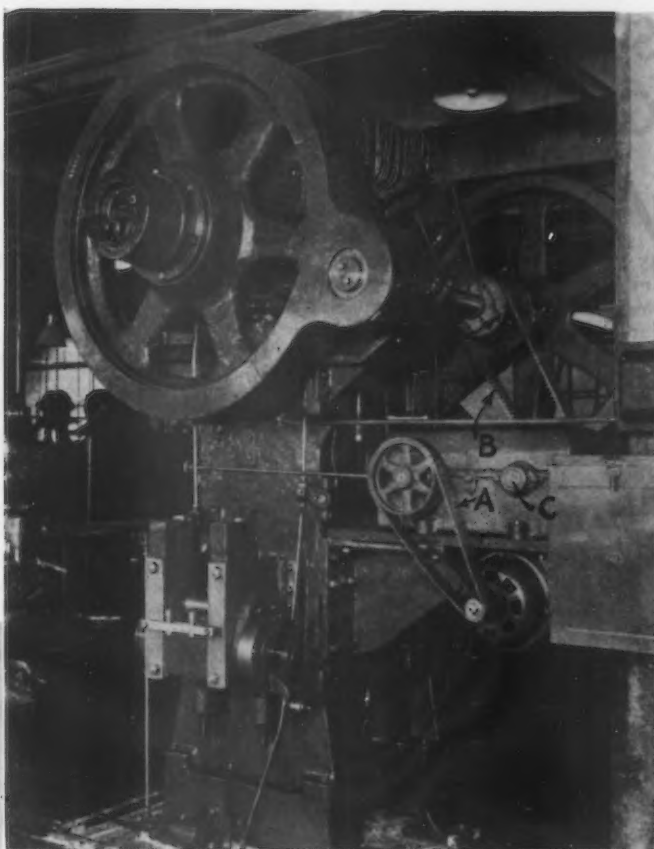
THIS combination angle plate grinder, Standard Electrical Tool Co., Cincinnati, has a pad on the back of the motor for boring mill mounting and one on the side for planer-rail mounting; lathe mounting is by angle plate. Clutch arrangement permits exchangeable extensions.



APPEARANCE, accident avoidance, load safety and operator's protection are considerations which are said to have been met in the development of this industrial electric truck. The new housing adopted is featured as important to safety design. Description of the truck is given on page 45.



SOFT rubber "sandwiched" between sheets of Bakelite laminated forms a new material for the absorption of vibration, it is said by the makers, the Synthene Corp., Oaks, Pa. Produced under Bakelite patents, it is suggested for gaskets, machine tool and equipment mountings, furniture construction and wherever quietness and resiliency are demanded.

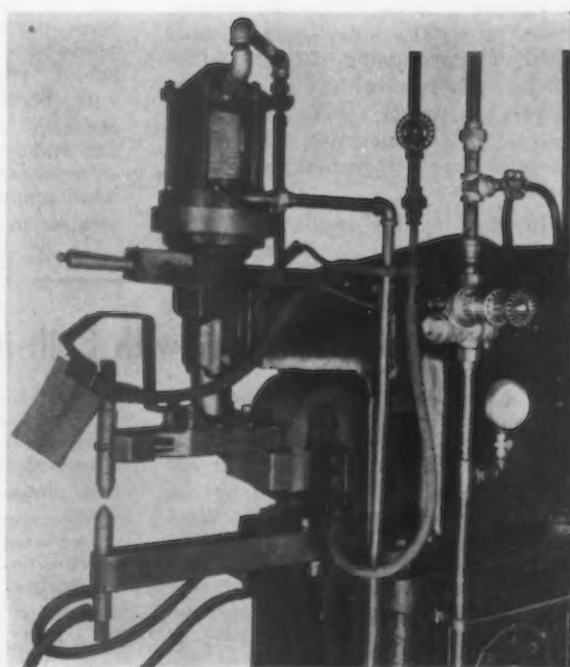


ABOVE

THE production behavior of this heavy punch press equipment, as it is set-up on accurate work, is said to be highly satisfactory, largely because of the method used for assuring quick control of operating speeds under all conditions. The details of the control are given on page 48.

AT RIGHT

INEXPENSIVE modernizing of manually-operated welding machines was the aim of the Hanna Engineering Co., Chicago, in developing this, either air or hydraulically-operated cylinder, which has pressure regulating valve and foot-operated cylinder control. The unit assembles on the electrode ram barrel flange. Correct and uniform pressure for each weld and less operating fatigue are claimed. The equipment is available in 3-in. diameter and larger sizes.



## Special Punch Press Equipped for Quick Control of Speeds

**A** HEAVY-DUTY application of the P.I.V. speed control system, which is manufactured by the Link-Belt Co., Chicago, is pictured on page 47. The special Bliss press shown was purchased last year for the production of chain links, and as set up is under speed control by a single hand-wheel.

A special bracket bolted to the press frame carries the P.I.V. unit. The motor is mounted on the under side of this bracket and transmits power to the constant speed shaft of the unit by a short-center silent chain *A*; another silent chain-drive *B* transmits power from the variable-speed shaft *C* of the unit to the press jack-shaft. The variation of speed for the shaft *C* of the P.I.V. unit is by hand-wheel,

which thus becomes the controlling element in machine speed operation.

The heavy-duty punch press which the Link-Belt Co. describes as a feature of production at its Dodge, Indianapolis plant, is of shrunk-in tie-rod construction; is equipped with double feed rolls and automatic lubrication, and was built at the Toledo, Ohio, plant of the E. W. Bliss Co.

The whole installation, says the Link-Belt Co.—press construction, transmission arrangement and speed control—makes a set-up on which a large variety of jobs can be run at high efficiency in the production of very accurate parts, for there is no lag in speed at the high pressure point as the positive chain drive keeps the flywheel up to full speed.

## New Material Features Unusual Insulating Qualities

**T**HE United States Rubber Co., New York, announces an insulating material, Laytex (patented), said to have 750 per cent elongation, and therefore extreme flexibility, 5000 lb. tensile strength per sq. in., and an insulation resistance constant, more than twice as high as that of the best grade rubber compounded under the requirements of the American Society for Testing Materials specifications.

Laytex is a liquid derived directly from latex, the milk of the rubber tree. The processing of the liquid includes the removal of all proteins, sugars and water solubles which are susceptible to moisture, and which therefore are detrimental to good insulation.

In applying the insulation a con-

ductor is run through a series of liquid baths, during each of which a film of insulation is coagulated directly onto the conductor from the liquid, due to the fact that the liquid is almost immediately converted into a solid. Solidification takes place before the conductor is in contact with any mechanical support, and because of this any breaks in the insulation are avoided.

It is reported that successful applications have featured development tests in emergency, or portable, telephone wire, non-metallic underground cables, portable cords, switchboard wire, blasting wire, seismograph instrument wire, vacuum cleaner wire and radio wire, and that thinner but superior walls, which make the finished conductors lighter in weight and smaller in bulk, are possible.

## Portable Grinder with Built-in Air Filter

**A** SMALL, portable, ball-bearing, electric grinder, having a speed of 17,000 r.p.m. and equipped with an air filter to assure only clean air entering the tool, is announced by the Chicago Wheel & Mfg. Co., 1101 West Monroe Street, Chicago. The tool weighs 4 lb., is 9½ in. overall, which includes the motor and air-body section, the latter being 3¼-in. diameter by 4½ in. long. The air filter, of viscous type, is easily removed for

cleaning and re-oiling. It is said that running tests over a period of one year in various shops have proved the efficiency of protection against all dust and abrasive matter, and also that ventilation is in no way impaired even if the filter should become loaded with foreign matter. The 5-in. long handle is integral with the motor body, is shaped to fit the hand and is covered by a soft rubber cushion-grip insulation. The design, coupled with stat-

ically and dynamically balanced armature, is claimed to result in an easily handled tool, with ample power to drive a 2½-in. wheel. The case-hardened chuck is universal and the wheels or cutters mounted in it will reach inaccessible spaces and holes with little difficulty. See page 46.

## Motor Reducer Unit Is Angularly Adjustable

**T**HE Dumore Co., Racine, Wis., announces a new universal motor with built-in speed reducer, the type K3-M, 1/7-hp. The single gear reduction unit is capable of carrying the full power of the motor. Three gear ratios, namely, 5 to 1, 14½ to 1 and 34 to 1, giving shaft speeds of 1300, 448 and 191 r.p.m. respectively, can be supplied. The grease-type gear housing forms an integral part of the motor frame. The illustration on page 46 shows standard mounting; when required, the gear unit can be positioned on the motor case so that the gear shaft projects at any desired angle in relation to the base, but always at right angles to the armature shaft. The gear unit is fitted with a single ball-thrust bearing to take the thrust of the worm. The reverse direction of rotation is taken care of by fitting the motor with a ball-thrust bearing at the end opposite the gear unit. A forced air ventilation is provided. The complete unit weighs 7½ lb.

## New Trade Publications

**Race Grinding Machine.**—Landis Tool Co., Waynesboro, Pa. Catalog No. 34, 12 pages devoted to hydraulically-operated race grinders, including a new, recently announced line of external machines. Cuts of machines and close-ups of set-ups and wheel positions are shown.

**Twist Drills.**—American Twist Drill Co., Detroit. Sliding envelope price list, arranged by drill size and decimal equivalents for quick determination of drill prices, either singly or in dozen lots.

**Horizontal Grinder.**—Williams, White & Co., Moline, Ill. Circular with description and cuts of new principal details in a new Osterholm horizontal grinder.

**Gears and Speed Reducers.**—Philadelphia Gear Works, Philadelphia. Catalog of 48 pages, giving, in convenient form, prices and descriptive data covering gears of all types, pinions, including non-metallic, speed reducer units, motoreducers, chains, sprockets, and other transmission equipment. Useful engineering data include tables of horsepower capacities for spur gears.

**Shaftless Motors.**—Louis Allis Co., Milwaukee. Bulletin No. 516 pictures applications to various types of machine tools and other equipment and gives detail sketches along with tabulated information covering sizes, frames, horsepower and revolutions per minute.

# Industry's Part in Social Progress

**A**T this moment all of the productive and constructive elements of this nation are engaged in a common task and are working toward a common end.

But the task before us and the ends we seek are seen in different aspects by different units of the cooperating groups. Some have taken a narrow sector for their field, others a wider one. For some the ends are obscured in a devotion to the means employed; for others the ends are so vast that they are magnificently vague, and the means are indeterminate.

These things being true, it is no wonder that we have the appearance of a nation working frantically at cross purposes. Some are intent on raising prices, some on lowering prices, others on price fixing. Some would increase working hours, others decrease them. Some would cut governmental expenditures, others expand them. Some would take land out of agricultural production, others—or even the same persons—would initiate irrigation projects which will increase the crop yield. Some call for a closer governmental or industrial control, others plead for more freedom. And all of this is but the first page of the volume of our inconsistencies.

Fronted as we are by this confusion we must in the first place seek some clear statement of our purposes—a statement which will be broad enough to be generally acceptable, yet deep enough to have a content of vital social meaning. It must be an expression of purpose on which industry, agriculture, commerce, finance and statesmanship must perforce agree. Let us attempt such a statement:

As our social objective in the material realm, we would provide for the mass of the population a scale of living which on the whole is continually rising, and is free from severe or destructive fluctuations. In the spiritual realm we would diminish the need for consuming anxiety among the body of the population, and would foster and preserve such elements of personal liberty as are not in conflict with the preceding purposes.

## Important to Differentiate Between Means and Ends

It is highly important that we state our objectives, and that we put them in terms of human values; for human values are the real objectives of a cooperative social undertaking, such as that in which we are engaged. The

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By **RALPH E. FLANDERS**

President, Jones & Lamson Machine Co.,  
Springfield, Vt., and president, American  
Society of Mechanical Engineers

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purpose of our cooperation is not and cannot be the strengthening or defeat of a labor organization or of a political party, the return to the gold standard or the adoption of some kind of a managed currency, the expansion

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**T**HIS address by Mr. Flanders was made at a banquet held Oct. 12 at the Queen City Club, Cincinnati, in commemoration of the fiftieth anniversary of the Cincinnati Milling Machine Co. Frederick V. Geier, president of the company, was toastmaster, and the attendance included some 250 prominent executives of the machine tool and allied industries. A detailed account of the complete anniversary celebration, which opened Oct. 8 with an exhibition of machines built by the company, will be included in a forthcoming issue.

Mr. Flanders sees evidence of changes in policy of government, labor and some sections of industry. The worst is now behind us, he said. A moderate, judicious but widespread expansion of business enterprise is the stuff of which a safe recovery, a solid prosperity is made. Safe expansion of credit, of employment and of purchasing power comes from a natural, unforced expansion, made in reasonable hope of expanded profits. These profits flow steadily into the markets for durable and capital goods and into the expansion of personal and social services. On the expansion of these profits depends our only solid hopes for large-scale reemployment, he said.

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or contraction of the national debt, the increase of government-operated business undertakings or the withdrawal of government therefrom, the regimentation of industry or the encouragement of free competition, the raising, lowering or fixing of prices or the price level. On all of these things and on many more of similar importance each of us holds strong views. But is there any one of us who would not willingly change our views and seek means of corresponding changes in business and financial practice, if it became clear that we could thereby more readily and safely gain our common social ends?

These other matters, important though they be, are only means to an end, not the ends themselves. We can the more easily view them with an open mind, and enter into the necessary adjustments and compromises relating to them, if we recognize them as means, not ends.

## Scale of Living Determined by Volume of Goods and Services

Let us consider particularly the first element in our stated purpose, expressed in these words:

"As our social objective in the material realm, we would provide for the mass of the population a scale of living which on the whole is continuously rising, and is free from severe or destructive fluctuations."

Now the scale of living is determined by the volume and quality of goods and services placed at the disposal of the individual. The provision of these goods and services is the task for which industry is organized; it is the reason for its very existence. We thus arrive directly at the heart of our problem.

Our objective requires that more and better goods and services be provided, and distributed. Higher and even higher production is the direct and primary means to this end. Those of us who are in industry, and particularly those of us who devise and provide the tools of industry, have no doubt in our minds as to the physical possibility of continuing this improvement in the scale of living which has been in progress for the last century and a half. The improved machines and advanced forms of organization are here, and further and yet further progress is in sight. Why should we not move forward?

The responsibility for our delay cannot be placed *in toto* on the

shoulders of any one person or group. Government, labor and industry itself, will have to share the blame.

Business, until very recently at least, has been fascinated by programs of production control, price fixing and other practices, aiming toward assurance of profits, but ignoring this primary need for more goods and services. In fact, these programs work for fewer goods and services and thus for a lower standard of living. Such policies will not even give that assurance of profits which is their purpose. They will only assure ever-shrinking profits on a shrinking volume of business and a lowered scale of living. The reasons for this I will not now discuss, having recently done so on another occasion, when the close parallel between these policies and those of union labor was pointed out.\*

#### Administration Policies Conflicting

As to the administration, we have already noted that its policies have been numerous and conflicting. With one hand it has sought to raise prices and with the other to lower them. It has sought to expand business operations and business credit, at the same time that its really effective agents in legislation and administration were seeking materially to diminish business profit and even the hope for profit. For political purposes it has given its preponderating support to one type of employer-employee relation—the labor union—even though union policies tend away from, rather than toward, the objective we all wish to attain.

In seeking to correct the faults of attitude and action which stand in the way of recovery we will run afoul of false conceptions in all of the groups, and with some fallacies which are common to all; but the major misconceptions appear to lie in the inability to realize that more goods and services, rather than changes in hours and wages, is the essential thing; and in the failure to appreciate the function of profit from productive business as the effective provider of this plenty, and of the increased employment by which this plenty is distributed.

Let me pause at this point to say something of very great importance. It is required by the conditions through which we are passing that industry make plain to itself its relations to the social problem, doing it honestly and realistically. Having done so it is required that it shall speak out clearly, directly and without reserve, not only as to its own functions and duties, but with relation as well to the function of its partners, labor and government.

\*See article "In Business Risk Lies Social Safety," in *THE IRON AGE* of Sept. 27, 1934, and *American Machinist* of Sept. 26, 1934.

†See author's paper "An End to Unemployment," published by the Industrial Advisory Board of the NRA.

There is no substitute for clear thinking and plain speaking if we are to make progress toward our social goal.

With this preparation, and in this spirit, let us proceed with our discussion.

#### Comments on Views of A. F. of L.

There is perhaps no better way to approach this aspect of our problem than to study the official view of the American Federation of Labor, presented in the annual report of its executive council, as published in the *New York Times* of Monday, Oct. 1, 1934. It is too long a document to be read to you in full. An endeavor will be made to give a fair condensation, interspersed with comments.

The volume of goods produced and the aggregate of service rendered is our real national income. In these terms our economic history has been the history of swift and gigantic industrial growth. Along with almost constant acceleration in the rate of output went the steady expansion of the consuming power of the American people.

This opening sentence forms an excellent statement of the conditions productive of a rising standard of living.

Following the collapse of our top-heavy debt structure in 1929, the real income of the nation began to fall off at a rapid rate.

Today we have about five million more residents in the continental United States than we had in the predepression year. To provide for these additional millions of Americans on the 1929 scale our production must exceed the volume attained in that year. This can be done only by reconstructing the efficiency and coordination of our entire economic system along new lines. With 10,000,000 wage-earners idle and with a large portion of our factories empty, we must be careful to insure return to the predepression production levels, which would not be deceptive and temporary but built upon the sound foundation of permanency.

In this statement the labor leaders display an insight superior to those financial leaders who filled the depression years with their warnings that we were suffering from having lived too high—that never again must we produce and distribute as much as we did in 1928 and 1929. Of course this is pure folly. Some individuals may have lived too high for their own good. Some speculative activities were pushed to disastrous limits. But the plain citizens of this country suffered from no surfeit of goods and services.

With unprecedented changes in mechanical equipment of industry, the problem of technological unemployment came to the fore since the World War.

Even accepting the conservative estimate for this period made by Dr. Mills of the National Bureau (Frederick C. Mills, "Economic Tendencies in the United States"), we find that from 1919 to 1929 output per worker employed increased approximately 43 per cent. This means that work requiring 100 men in 1919 could be

done by 70 in 1929, and that 30 out of 100 could have been dispensed with.

Here the reasoning begins to go wrong. Why need these men be dispensed with? If we want more goods than we are now getting, they can make them for us. If we prefer more leisure to more goods, we can shorten the working day. But note that shortening the working day is not the way to get more goods. There is doubt about the facts, as well. Statisticians apparently do not agree. Data to be introduced later indicate that the industrial production per capita did not rise more than 20 per cent in that period, and that there was no increase in percentage of unemployment to be reckoned with.

The years of business prosperity brought not only expanding production and rapidly increasing productivity, but also instability of employment and uncertainty of income to the wage-earner.

The tendency toward increased instability of employment rather than an increase in unemployment, is one of the real evils of increased mechanization, and of the uncontrolled operation of our credit money system. Here is a real field for improvement. It is possible both to decrease the instability and to protect the worker from what remains (†)—possible that is, if the profit system is permitted to perform its full social function.

According to the recent figures of the National Bureau of Economic Research, between 1929 and 1933 the output of the worker per man-hour was increased by 27 per cent.

A work week averaging about 50 hr. in 1929 has been reduced to about 38 hr. in 1933, with the depressed rate of activity keeping the weekly hours well below the maximum prescribed in the NRA codes. This 25 per cent drop in weekly hours reduced the total man-hours by 50 per cent since 1929. Under these circumstances a 27 per cent advance in the output per man-hour is indeed striking.

These figures are rather startling, indicating, as they do, an increase per worker of more than 80 per cent since 1919. It is doubtful whether they constitute a fair section of industry, or are taken from exceptional samples. One thing is sure. For business as a whole this latest increase in efficiency was developed out of the necessity for keeping out of the sheriff's hands. It was the price of survival, not the source of profits.

During the post-war decade the volume of goods and services produced in the United States was being increased at a rate never before maintained for a similar period of time. But under this rapid acceleration in the rate of production, the economic system was showing definite strains and maladjustments.

We have every indication that too large a proportion of our productive resources was poured into the production of durable goods and especially of capital equipment. It is highly significant that the falling off in the production of durable goods and capital equipment was the most

important factor in the decline of the productive rate during the depression.

Here the document, like nearly every other one of its kind, leaps to the purely gratuitous assumption that the "strains and maladjustments" and any unwise additions to capital goods were derived from undue profits and from a serious maldistribution of wealth in industry. These phenomena did not appear in industry. The dogs have been barking up this tree for years; but they can't get the coon. *He isn't up that tree.*

The strains and the maldistribution and the unwise provision of capital goods were derived from the billions of dollars of fallacious purchasing power injected into our economic system by credit based on speculation, and disastrously destroyed by the four years of inevitable and retributory deflation. The coon is up *that* tree, miles away from where the dogs are barking.

It is important to realize that in the post-depression period the purchasing power of the consumer will be applied primarily to the acquisition of commodities most essential for human consumption. It will be some time, therefore, before we begin to increase savings—some time, in other words, before we begin to spend on a large scale for further incomes and thus supply investment funds necessary for new production of capital equipment.

We are thus faced with potential serious checks to reabsorption by the industry of those now unemployed.

This is a fair statement of the inexcusable condition into which current trades union and governmental policies have been leading us. It is going to be some time before we increase savings and supply investment funds for capital equipment; therefore, it is going to be some time before the main body of the unemployed, normally producing capital goods, are taken off the relief rolls and permitted to earn the good living which they are capable of earning. And this is because we have been willing to encourage anything except business profit, which is the only thing which can employ the unemployed in the depressed industries. Instead of fresh air, pure water, nourishing food and exercise, we are treating business to dope, blood-letting and hypnotism—and some of this treatment is self-inflicted.

Further and substantial increases in wages for industrial labor must be made to encourage a demand for durable goods, as well as consumption goods.

Provided with adequate purchasing power, we can substantially accelerate the rate of production of goods and services.

And so we can. But why is purchasing power so shy? We raise wages, we "prime the pump," we cram the banks with credit. All is of no avail. Before the phantom of false mourning died methought a voice within the temple cried, "When all

this credit is prepared within, why lags the doubtful business man outside?"

The answer is simple. We are deficient in purchasing power. We are deficient in that principal element of purchasing power and employing power which is represented by credit money, and is generated by bank borrowing for current business operations. The borrowing cannot and should not take place on an increasing scale until the prospect of business profit becomes hopeful. And this will be difficult until labor, while correcting local and specific injustices, develops for its major strategy something more constructive than mass attacks on slender and vanishing profits.

When labor permits, when government encourages and when shrewd business takes a chance, then will reemployment and rising real wages proceed with accelerated pace.

There is ample evidence of the immediate and pressing need for a further shortening of hours of work as a first step toward stabilization of employment. The general adoption of a shorter work week is bound to bring a sustained industrial stability.

What a strange conclusion, presented *without* the evidence, and in the face of the introductory statement that a rising standard of living demands more goods and services! And what a direct blow at reemployment in the depressed industries, whose only hope lies in the reappearance of profits, which this policy would destroy!

Labor should be given an opportunity to join hands with the management in the great national enterprise of rebuilding our industrial economy on the basis of social as well as economic efficiency and thus assure a return to prosperity more permanent and more equitable than we have seen.

To this let us say a hearty Amen! This past year I have had the pleasure and honor of meeting a number of the principal labor leaders of the country. It is impossible to make their acquaintance and not be impressed with their intelligence, honesty and devotion to a worthy cause. If they can forsake their concentration on attractive but shallow and ineffective means, and will join in a search for effective and practical ways of attaining such ends as were set forth at the beginning of this document, they may demand that business take the no less difficult step of meeting them half-way.

Statesmanship in Labor, joined to statesmanship in Business, will generate statesmanship in Government—and thus three vacuums will be filled.

#### Economic Fallacies Challenged by Colonel Ayres

There is no need for me to go into an analysis of the underlying fallacies of this A. F. of L. document, or

of the corresponding underlying trend of governmental attitude and policy, which so faithfully follows it. That task was done effectively two weeks before the A. F. of L. meeting by Col. L. P. Ayres in the Cleveland Trust Co. Bulletin of Sept. 15—one of the most remarkable documents that has come to light in many months.

Colonel Ayres challenges and destroys the seven major economic fallacies: overproduction, concentration of wealth, effectiveness of redistribution of income, high profit margins, taxation possibilities, effectiveness of inflation, and recovery through consumer purchasing power. Each point is illustrated by an illuminating diagram.

His diagram of per capita production shows that the increase from 1919 to 1929 was by no means out of line with the trend from 1900 onwards. It represented a desirable rise in the scale of living and gives no evidence of a general provision of excess productive capacity. This rise in productivity is of the order of 20 per cent rather than the 43 per cent of the Federation report; nor was there any great decrease in employment to account for the discrepancy.

#### Distribution of Income Discussed

The diagram for the distribution of income is the most astonishing of the seven. It indicates that the richest 10 per cent of the population receive little more than 11 times as much per person on the average as the very poorest 10 per cent; and the next to the richest 10 per cent receive less than three times as much as the next to the poorest. There is not a social reformer in the land, or a plutocrat either, who will not be astonished and skeptical at this exhibit. And this was in 1929!

But perhaps the next diagram is worse yet. Again in *anno mirabilis* 1929, if all wage earners had divided equally the total of wages actually paid they would have received \$119 a month each. If in addition the salaries, bonuses (don't forget those published bonuses!) dividends and other shares of proprietors had been taken away and given to the wage earners, it would have given them only \$12 more per month each, or less than a 10 per cent rise in wages. As Ethel Barrymore used to say: "That's all there is—there isn't any more." Yet when have we seen a strike leader willing to confine his requests to an insignificant 10 per cent?

Yet while there isn't any more, there is no reason why there can't be more in the future, resulting from a growth in real income such as the worker has already experienced over the decades, but with that advance accelerated and steadied. The advance will be generated, as in the past, by a preliminary stimulation of profits in

(Continued on Page 84)

## Combination Blast And Tumbling Mill

A CLEANING machine that is a combination of a blast mill and tumbling mill has been brought out by the W. W. Sly Mfg. Co., Cleveland, and will be exhibited at the Foundry Convention in Philadelphia. It is a radical departure in cleaning equipment and can be used for both blast cleaning and tumbling in combination and simultaneously. A blast cleaning device creates an abrasive blast without the use of compressed air and thus eliminates equipment required in the handling of compressed air.

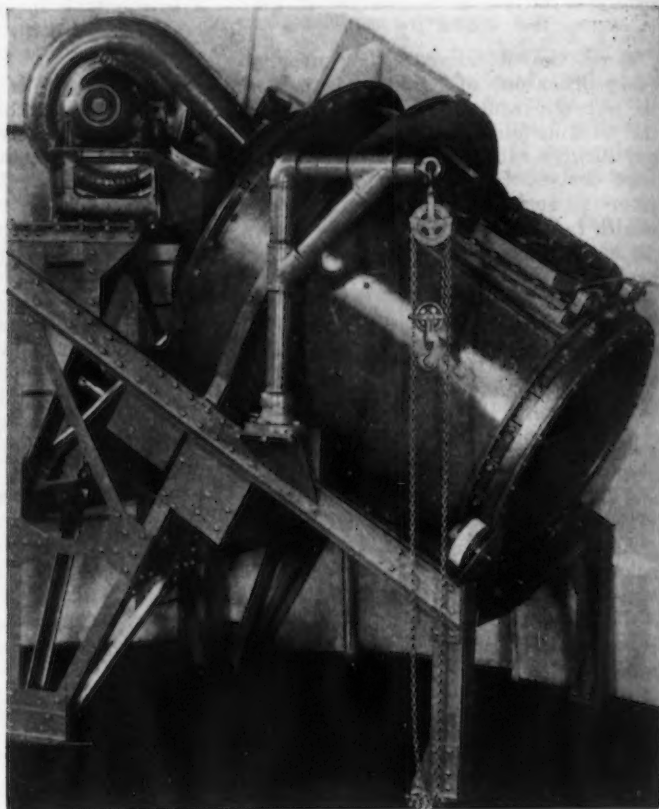
The machine has a one-piece barrel that revolves at an incline of 30 deg. from the horizontal. The barrel is 42 in. in inside diameter by 36 in. deep. It is perforated with  $\frac{1}{2}$ -in. holes to provide an outlet for the abrasive and the dust and dirt. An outer shell slightly tapered is attached to the mill barrel and revolves with it. The abrasive is cleaned and returned within the barrel, making a complete circuit without leaving the barrel. This permits the construction of a blast barrel which is a self-contained unit and which is dust and abrasive tight and is claimed to eliminate all danger from dust contamination of the atmosphere surrounding the machine.

The abrasive enters the space between the barrel and the outer shell through the perforations in the barrel. A spiral flight brings the abrasive to the forward high end of the mill, where it falls into buckets which raise the abrasive and discharge it into a feed hopper over a blower. The blower is mounted against the high end of the barrel and is direct connected to a 10-hp. motor.

The blower directs the blast into the barrel at an angle so as to strike the center of the load as it creeps up on the side of the revolving mill. The hopper feeds the abrasive to a special-type nozzle. The rate of feed is about one cu. ft. per min., weighing in the case of metal abrasive about 285 lb., so that a total of 8 to 9 tons of abrasive passes through the system per hour. However, as the same abrasive is being used over and over, the actual quantity of abrasive in the system at any one time is probably less than one cu. ft.

The mill is driven by a geared head, 2-speed motor, permitting it to revolve at 6 or 12 r.p.m. The higher speed may be used for the preliminary tumbling of castings to remove excess molding and core sand before blasting. The mill has an electrically operated gate which, during the pre-

▲ ▲ ▲  
Blast cleaning and  
tumbling machine, on  
exhibit next week at  
foundry show.  
▼ ▼ ▼



liminary tumbling, is in such a position that the molding and core sand are discharged through two spouts. During that time the abrasive is stored in a hopper just above the nozzle feed. A second position of this gate permits the abrasive to enter the nozzle for blasting, for which the mill is slowed down to 6 r.p.m. unless it is desired to speed up blast cleaning by operating the barrel at the higher speed.

The mill is equipped with an automatic electric control device which may be set for the following cycle:

1. Tumbling at 12 r.p.m. for a predetermined period, discharging molding and core sand to the outside.
2. Reduce speed of mill to 6 r.p.m., start blower and throw the gate to feed abrasive to the nozzle for blasting for a predetermined period. After the predetermined number of minutes of blasting the mill stops.

The machine is loaded and unloaded through a dirt-tight door 24 in. wide and 28 in. long in the side of the barrel. The only other opening is a small circular one where the blast from the nozzle enters the barrel.

The air that enters the barrel with the abrasive is taken out through the  $\frac{1}{2}$ -in. perforations into the outer shell and is exhausted through two dust pipe connections at the high end of the mill. This air passes through the abrasive as it is returned to the feed

hopper, assuring, it is stated, an excellent cleaning of the abrasive.

The load capacity of the barrel is about 10 cu. ft. or around 1000 lb. of castings, depending on the type, size and nature of the work.

Advantages claimed for this machine include a remarkable saving in power, dependability for performance and greatly reduced maintenance cost due to the simple and sturdy design and the elimination of abrasive and air lines, hose, small nozzles and other mechanisms generally used with blast mills.

## Steel Labor Board in Chicago This Week

WASHINGTON, Oct. 16.—The National Steel Labor Relations Board is sitting in Chicago this week hearing petitions and complaints of lodges of the Amalgamated Association of Iron, Steel and Tin Workers. Yesterday it had before it a petition of the Lake Front Lodge for an election at the East Chicago, Ind., plant of the Youngstown Sheet & Tube Co., and today it is hearing a petition of the New Deal Lodge for an election at the Hammond, Ind., plant of the same company. Tomorrow it will hear a complaint of Clearing Lodge charging the Continental Can Co., Chicago, with denial of collective bargaining rights. On Thursday the board will hear a petition of Dunes Lodge for an election at the plant of the Gary Screw & Bolt Co., Gary, Ind.



# THE NEWS OF THE WEEK

## British Mills Busy And Export Demand Better

LONDON, ENGLAND, Oct. 16 (By Cable).—British pig iron merchants are well booked with orders for the remainder of this year, there being a steady demand for small lots. Steel production also is increasing with semi-finished makers fairly busy and fewer orders are being taken by foreign competition. Part of this may be due to expectation of a raise in Government tariffs in the near future.

Finishing mills are kept busy on domestic business, particularly structural material, and the export improvement is also being maintained.

The admiralty has placed contracts for one flotilla leader and six destroyers.

September exports of pig iron were 7700 tons, of which 50 tons were for the United States. Total exports of iron and steel amounted to 198,000 tons.

Tin plate mills are operating at over 70 per cent capacity; business is being done abroad in this commodity with the Continent, South America and Australia.

Continental iron and steel demand is quieter, certain export markets having reached the saturation point. In this connection, semi-finished varieties, steel beams and bar demand is satisfactory, but plates and sheets are dull. Disappointment has been expressed regarding the Continent's small share in recent Japanese steel orders and American competition is believed to be responsible.

Owing to the weakness in Anglo-Saxon exchanges, the export coefficient has been raised from 1.65 to 1.675. International Hoop Cartel reports exports as quiet and the future obscure. The International Wire Export Co. reports a slackening of demand in certain markets with no improvement in total exports.

### British Prices, f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export .....	\$9	
Billets, open-hrth. .....	\$5 10s.	to \$5 15s.
Tin plate, per base box .....	18s.	2d.
Steel bars, open-hearth .....	\$7 17½s.	
Beams, open-hrth. .....	\$7 7½s.	
Channels, open-hearth .....	\$7 12½s.	
Angles, open-hearth .....	\$7 7½s.	
Black sheets, No. 24 gage .....	\$9 5s.	
Galvanized sheets, No. 24 gage .....	\$11 5s.	

### Official Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £

Current dollar equivalent is ascertained by multiplying gold pound price by 124.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange.

Billets, Thomas .....	\$2 7s.	
Wire rods, No. 5 B.W.G. ....	\$4 10s.	
Steel bars, merchant .....	\$3 5s.	
Sheet bars .....	\$2 8s.	
Plates, ¼ in. and up .....	\$4	
Plates, 3/16 in. and 5 mm. ....	\$4 2s.	6d.
Sheets, ½ in. ....	\$4 7s.	6d.
Beams, Thomas .....	\$3 2s.	6d.
Angles (Basic) .....	\$3 2s.	6d.
Hoops and strip base .....	\$4 2s.	6d.
Wire, plain, No. 8 .....	\$5 7s.	6d.
Wire nails .....	\$5 15s.	
Wire, barbed, 4-pt. No. 10 B.W.G. ....	\$8 15s.	

of machinery at the Worthington plants.

It is stated that the present extensive and modern shop facilities of Worthington, with the additional provisions being made for the fabrication of Carbondale's refrigeration condensers, piping systems, chilling machines and filter presses, will further extend the organization's ability to serve the refrigeration field.

Company engineers report many recently developed improvements of outstanding character in its refrigeration machinery, which will make available to users of air conditioning and all general refrigeration such as ice making, oil dewaxing, etc., full lines of machinery and complete operating outfits of the most modern design and construction.

## Foundry Congress To Consider Apprenticeship

THE Federal Government's new apprenticeship program, and how it affects the individual employer, will be the subject discussed by W. F. Patterson at the apprentice training session at the Fifth International Foundry Congress, in Philadelphia, which will be held at 2.30 Tuesday afternoon, Oct. 23.

Foundry executives will be deeply concerned, and will be interested in hearing from Mr. Patterson, the executive secretary of the newly created National Committee on Apprenticeship, just how the Federal program for coordinating apprentice training standards and NRA Codes affects them. As set forth in Executive Order No. 6750-C and General Regulation No. 1, the committee plans to set up State agencies to control apprentice training standards and to pass on individual apprentice contracts, subject to review by the Federal Committee and the Secretary of Labor.

Mr. Patterson has been directly interested in apprentice work for years, having served as apprentice supervisor for the Industrial Commission of Wisconsin and as personnel director for a large corporation before

## Refrigeration Consolidation

ANNOUNCEMENT is made of the consolidation of interests of the Carbondale Machine Co. of Carbondale, Pa., with those of the Worthington Pump & Machinery Corpn., in the general refrigeration field, operating in future as the Carbondale Machine Corpn.

The Carbondale Machine Corpn. will transfer all necessary personnel and equipment to Harrison, N. J., and in the future will build its lines

taking his present position with the Vocational School in Milwaukee.

Kenneth Coolbaugh of the Pennsylvania Department of Labor and Industry will speak on the necessity of apprentice training at the present time. Mr. Coolbaugh is well known through his writings on this subject. He has made a survey of conditions in regard to men in trades, and his conclusions will be valuable to foundry employers.

## Steel Beer Barrel Group Now All-Inclusive

ALL makers of steel beer barrels in the United States are now united as a group concentrating on a vigorous effort to make their metal containers the standard equipment of brewers throughout the country, according to announcement by Glenn W. Bittel, commissioner, Associated Manufacturers of Steel Beer Barrels, Cleveland.

At a recent meeting in Detroit four more companies were admitted to membership, bringing the total to 11. The new members are: the Bossert Corp., Utica, N. Y.; Fedders Mfg. Co., Buffalo; Firestone Steel Products Co., Akron, Ohio, and Motor Wheel Corp., Lansing, Mich.

## Plant Visits to Feature Foundrymen's Convention

Plant visitation to nearby foundries will be an interesting feature of the Fifth International Foundry Congress and thirty-eighth annual convention and exposition of the American Foundrymen's Association in Philadelphia, Oct. 22 to 26 inclusive. On Friday afternoon, Oct. 26, a special train will take founders to visit the Bethlehem Steel Co., Bethlehem, Pa. This visit will include the steel, iron and brass foundries, coke plants, open-hearth furnaces, rolling and blooming mills, forge department, etc.

In addition, other interesting plants such as the Budd Mfg. Co., Henry Disston & Sons, the Point Breeze refinery of the Atlantic Refining Co., SKF Industries, and Radio Corporation of America, Camden, N. J., will be available for inspections.

## National Steel Corp. Declares Dividend

NATIONAL STEEL CORPN. has declared the regular quarterly dividend of 25c. a share on the common stock to stockholders of record on Oct. 22.

# Steel Corporation's September Shipments Decline Slightly—Exceed July Total

SHIPMENTS of steel products by the United States Steel Corp. during September amounted to 370,306 tons, compared with 378,023 tons in the preceding month and with 369,938 tons in July. In September,

1933, the Corporation shipped 575,161 tons.

September movement was sufficient to engage the company's finished steel making capacity at 23 per cent, as against 23.1 per cent in August.

MONTHLY SHIPMENTS OF STEEL PRODUCTS BY UNITED STATES STEEL CORPN.

Month	1930	1931	1932	1933		1934	
				Ship-ments	Per Cent of Capacity	Ship-ments	Per Cent of Capacity
January	1,104,168	800,031	426,271	285,138	17.7	331,777	19.8
February	1,141,912	762,522	413,001	275,929	18.5	385,500	26.3
March	1,240,171	907,251	388,579	256,793	15.3	588,209	36.6
April	1,188,456	878,558	395,091	335,321	21.6	643,009	41.5
May	1,203,916	764,178	338,202	455,302	27.1	745,063	44.4
June	984,739	653,104	324,746	603,937	37.4	985,337	61.2
July	946,745	593,900	272,448	701,322	45.1	369,938	23.0
August	947,402	573,372	291,688	668,155	39.8	378,023	23.1
September	867,282	486,928	316,019	575,161	35.6	370,306	23.0
October	784,648	476,032	310,007	572,897	35.5	.....	.....
November	676,016	435,697	275,594	430,358	26.7	.....	.....
December	579,098	351,211	227,576	600,639	38.7	.....	.....
Plus yearly adjustment	(40,259)	(6,040)	(5,160)	(44,283)	...	.....	.....
Total for year	11,624,294	7,676,744	3,974,062	5,805,235	30.1	.....	.....

## Trackwork Shipments Fall in September

SEPTEMBER shipments of trackwork for tee rail track 60 lb. per yd. and heavier amounted to 3383 net tons, according to the American Iron and Steel Institute, compared with 5364 tons in August, and with 3845 tons in September, 1933.

In the first nine months of this year trackwork shipments were 13,973 tons, compared with 10,252 tons in the corresponding 1933 period and with 5117 tons in the first nine months of 1932.

## Mellon Institute Expands Research On Enameling

THE O. Hommel Co., Pittsburgh, has authorized the Mellon Institute to add another specialist to its fellowship on enameling and Dr. Edward R. Weidlein, director of the institute, has announced that William J. Baldwin has been appointed to this post. Mr. Baldwin is a ceramic chemist who was educated professionally at the University of Buffalo (B.S. 1926) and was in the employ of the American Radiator Co. at Buffalo from 1926 until he joined the institute on Oct. 1.

During his eight-year connection with the radiator company, Mr. Baldwin became acquainted with the problems of vitreous enamel. He gained experience in the analysis of raw materials and the utilization of various chemicals in frit making. In addition to laboratory research work on vitreous enamels he has had practical experience in the wet-process enameling

field, including both steel and cast iron enamels, and with the radiator company he served as foreman of the mill room and the smelting department.

In his position on the fellowship of the Hommel company, Mr. Baldwin will devote most of his time to investigations in plants. J. H. Waggoner, the original incumbent of the fellowship, will continue his duties.

## Bryant Machinery Co. Appoints Toledo Agent

FRANK D. LAKE & ASSOCIATES, 3024 Cherry St., Toledo, Ohio, have been appointed exclusive agents by Bryant Machinery & Engineering Co., Chicago, covering the following lines of machine tools; Ohio shapers; Dreeses radial drills; Ohio horizontal boring, drilling and milling machines; Boye and Emmes engine lathes; Cleerman heavy duty drilling machines; and Kling heavy duty grinders.

The department of street railways, Detroit, recently purchased 88 street-car gear unit drives of the parallel type from the Nuttall Works, Westinghouse Electric & Mfg. Co. Equipped with helical gears and Timken roller bearings, these drives operate quietly and permit a reduction of dead weight on the axle, thus improving the riding qualities of the cars. With these units it is possible to use 22-in. wheels instead of 26-in. wheels, thus lowering the height of the car floor and facilitating rapid loading and unloading.

# PERSONALS

A. F. STUEBING has been appointed railroad mechanical engineer of the commercial office of the United States Steel Corp., with headquarters at 71 Broadway, New York. Mr. Stuebing was born in Lewiston, Me., May 24, 1889, and received his formal education at Cornell University and the University of Illinois. He entered railroad service in 1911 with the Boston & Albany, following which he was with the Pennsylvania Railroad, with the Chicago, Rock Island & Pacific, and with the Simmons-Boardman Publishing Co. as associate editor of *Railway Age* and managing editor of *Railway Mechanical Engineer*. From 1923 to 1932 he was chief engineer of the Bradford Draft Gear Co. and its successor, the Bradford Corp., and since has been chief engineer of the Par Car Corp. He is a member of the American Society of Mechanical Engineers and a past chairman of the railroad division. Mr. Stuebing has been a frequent contributor to technical periodicals, and has presented numerous papers before engineering societies and railroad organizations.



A. F. STUEBING



R. L. VAN CLEVE

RUSSELL L. VAN CLEVE has been appointed manager of blast furnace products, coke by-products and scrap for the Carnegie Steel Co., Pittsburgh. He succeeds Thomas Woods, whose retirement was announced recently in *THE IRON AGE*. Mr. Van Cleve was graduated with a civil engineering degree from Princeton University in 1913. He began his career that year with Riter-Conley Mfg. Co., Leetsdale, Pa. In January, 1914, he entered the open-hearth department of the Carnegie Steel Co. Later in the year, he took a postgraduate course in the company's Edgar Thomson works. In 1916 he worked in the Edgar Thomson rolling mills and in 1917 became chief clerk in the open-hearth department. Since September, 1920, he has been identified with the Carnegie general office at Pittsburgh, where he has been chief clerk to the assistant to the president.

GLENN D. EAST has resigned as Cleveland district sales manager of the Empire Sheet & Tin Plate Corp., Mansfield, Ohio, and has become connected with the sales department of the Wheeling Steel Corp.

E. S. ROONEY, who has been associated with the Youngstown Sheet & Tube Co. for 28 years, for the past 11 years as district sales manager at Cincinnati, was retired on Oct. 1. KENNETH J. BURNS, who has been stationed at the company's headquarters at Youngstown, will succeed Mr. Rooney at Cincinnati.

G. LOFBERG, heretofore identified with the Uddeholm Co. of America, Inc., New York, has become identified with S.K.F. Steels Inc., New York. ERIK V. ENEVIK succeeds him at the Uddeholm company.

G. R. SCANLAND has been elected chairman of the executive committee of the Shippers Car Line Corp., American Welding Co., and of the Acme Tank Car Corp., subsidiaries of the American Car & Foundry Co., New York, succeeding WILLIAM M. HAGER. ROBERT ROGERS has been elected president of the three subsidiaries succeeding R. H. DAVENPORT.

FRANK KELLY, formerly traffic manager of the United States Steel Products Corp., and American Steel Export Co., New York, has been made manager of the order and traffic department of Otto Kafka, Inc., New York. W. C. HAYS and C. H.

BRUSHABER have been elected vice-presidents of the company.

P. T. BORTELL has been elected vice-president of John Chatillon & Sons, New York, and A. W. FUCHS has been made treasurer.

ARNOLD LENZ, assistant manufacturing manager in charge of the Flint, Bay City, and Saginaw plants of the Chevrolet Motor Co., will be awarded the Whiting medal "for his conspicuous contributions to the foundry industry" at the annual convention of the American Foundrymen's Association next week.

E. P. KASTIEN, who has been identified for 18 years with the Keystone Steel & Wire Co., Peoria, Ill., has been promoted to the position of general superintendent in charge of operations and purchasing. He has served as purchasing agent since 1921.

WILLIAM ANDERSON has been made Southwestern representative, with headquarters in Dallas, Tex., by the Central Iron & Steel Co., Harrisburg, Pa.

DR. ROBERT F. MEHL, director of the metals research laboratory at the Carnegie Institute of Technology, has been awarded the John Scott Medal by the Philadelphia Board of City Trust, administrator of the fund, "for his discovery of a method of taking pictures through great thicknesses of steel to determine internal effects."

ESSINGTON LEWIS, managing director, Broken Hill Proprietary Co., Ltd., Melbourne and Newcastle, New South Wales, Australia, who has been touring Germany, France and England, is new in the United States on his return to Australia, with plans to sail from Vancouver early in November.

WILLIAM E. S. DYER, who has been actively engaged in the consulting engineering field for nearly 30 years in the design, construction and operation of high-efficiency power plants, has been elected president of the Edge Moor Iron Co., Edge Moor, Del.

JOSEPH L. MCCLANE, factory manager of the Chance Vought Corp., Hartford, Conn., has been elected to the board of directors.

E. H. WELKER, president of the Welker Machinery Co., Inc., Detroit, has been elected to the board of directors of the Braeburn Alloy Steel Corp., Braeburn, Pa.



## Trend in Washington is Now More Favorable

*When Election Influences Have Passed Business and Private Initiative May Receive More Encouragement*

**W**ASHINGTON, Oct. 16.—The Roosevelt administration wants the price level to go higher. But the means in mind is not through monetary manipulation. Without definitely stating the contemplated process, it is indicated that reliance is being placed on private industry and on the orthodox law of demand and supply. This policy was made known at the White House.

Policies of the newly organized National Industrial Recovery Board remain obscure. But, according to Chairman S. Clay Williams, they are being studied with a view to taking as rapid action as possible. Such major matters as hours, wages, price fixing and production control will be determined by the "particular setting" of individual industries. NRA's calling back to its staff of such men as W. L. Allen and W. A. Harriman as special advisers on reorganization is pointed to as a turn to the "right" and a more sympathetic attitude toward industry, including iron and steel.

For the present, at least, the Department of Justice has decided not to prosecute the Houde Engineering Corp., Buffalo, for alleged violation of section 7-a (collective bargaining) of the Recovery act. Asked by the National Labor Relations Board to proceed with the case, the department has declared that there is insufficient evidence so far for prosecution. This development may be far reaching in the way of a cessation in "cracking down" on industry for alleged labor section violations. How-

By L. W. MOFFETT

Resident Washington Editor, THE IRON AGE

ever, in the past the Department of Justice has held up prosecution in similar cases, notably that of the Harriman, Tenn., textile case. As in the latter case, organized labor again has been aroused and is demanding prosecution in the Houde case.

Organized labor also assumed an attitude of increased militancy at the San Francisco convention in once more coming out in favor of the 30-hr. week, and despite a schism within its own ranks also went on record for the vertical as opposed to the craft union. With predictions being freely made that the next Congress will be exceptionally radical, it is evident that organized labor generally thinks it can jam through the 30-hr. week and other phases of its legislative program, perhaps even over opposition from the White House, should that develop.

### Developments Considered Favorable

The foregoing reflect the principal highlights of especial importance to industry which have developed the past week. On the whole they are favorable. There appears to be a growing tone of conservatism in official quarters attributed to an under-surface feeling of greater concern over the industrial outlook and the unemployment situation as winter approaches. This statement, how-

ever, is made with reservations. For policies shift so quickly that confusion is far from being removed.

The Administration policy on price levels and denial that a further devaluation of the dollar was contemplated were given great importance. The move toward a "reasonable increase" in prices obviously is simply a return to efforts made earlier in the year with only temporary success. What the revived policy may accomplish naturally remains to be seen. It seems evident, however, that it was felt that Administration announcement in favor of higher prices would in itself bring hesitant consumers into the market and it was especially timely on the theory that the buying season is at hand. It seems to be the view that growing demand would bring about higher prices. Thus the policy appears to be based on the law of supply and demand. Denial of plans for monetary manipulation followed rumors that this method would be resorted to to raise prices and quickly put a quietus on unnatural rises in stock and commodity prices with an accompanying slump in dollar exchange. Greater reliance on natural forces was reassuring. But while favoring a higher price level, the White House warned that the advance must be reasonable. It was intimated that profiteering would be met with abandonment of the move toward higher levels, levels that, it was said, are not to be rigidly based on 1926 prices or any other specific period but that reflect a "parity" between agricultural and manufactured products,

whatever that may mean. Nor, was it indicated, that all prices would be raised. Some clearly are looked upon as having been kited too much and are meeting with growing consumer resistance, a fact especially true of some kinds of foodstuffs, such as meats and canned goods.

#### "Supply and Demand" Reappears

The Administration move toward natural forces, and its assurance against inflationary processes, for the present at least, are held to be supported by the fact that past experience shows no actual relation between tampering with the gold value of the dollar and prices of domestic products. The move therefore was construed as a direct turn from the Warren theory. Prices of commodities and of gold have been brought forth in abundance to disprove this relationship. For example, in metals and metal products it has been pointed out that prices are but 11 per cent higher than they were in March, 1933, while the dollar price of gold has been increased 69 per cent through devaluation. Contrasted to the small increase in metal prices, prices of food products have risen 70 per cent. The rise in level is not attributed to any great degree to dollar devaluation but rather to exertion of natural forces, substantial in some lines, discouragingly light in others such as steel and to other causes, including codes, calling for higher wages and shorter hours, AAA crop production control policies, the drought and scarcity of certain agricultural commodities. The administration announcement of no contemplated devaluation was made simultaneously and given practical support through the action of the Treasury department in announcing three days ahead of time that it was calling in an additional \$1,870,000,000 Fourth Liberty 4½'s for redemption April 15. The price increase policy, however, is hardly consistent with the administrative order of June 29 which invited bidders on Government business to slash code prices by as much as 15 per cent. Inasmuch as this order has brought no results, it is a question as to whether it has been placed in limbo, or in a cool place.

#### NRA in Plastic State

Turning to the NRA, it is decidedly in a plastic state. The new National Industrial Recovery Board evidently is trying to get its bearings. Perhaps, too, its members are trying to get better acquainted, seeing that there is such a wide divergence of social and economic thought among them. This is a fact that is kept in mind when doubt is expressed that the board will click harmoniously and may sooner or later develop some distinctly sharp dissensions that will be laid at the door of the White

House for settlement. The board does have a list of subjects on policy over which it is mulling but as yet it has made no substantial progress. This is not surprising inasmuch as it is in its nascent stage. At that, however, it is clear that the board realizes it has some knotty problems before it and that on their solution depends much as to the future of NRA through treatment by Congress. That it is seeking careful thought on reorganization is plain. This is exemplified by the fact that NRA has called back to it such men as Mr. Allen, one of the first NRA deputies, and former chairman of the Sheffield Steel Corp., W. A. Harriman, and other industrially-minded men of prominence. Both Mr. Allen and Mr. Harriman resigned some time ago and returned to private life. Their return is looked upon as a move toward mollifying industry, including steel and other major lines, which showed concern over the new set-up of NRA and expressions from such men as Donald Richberg, director, National Emergency Committee, indicating relaxation of code provisions on price and production control. The return of the former NRA staff men as well as the appointment of other conservatives, however, has aroused organized labor which also has been laying down a barrage against Chairman Williams for his alleged anti-labor attitude. Mr. Williams, tobacco official, has been attacked particularly because of an alleged statement that 40c. an hr. was "an excessive minimum wage" to be made for skilled workers. The San Francisco convention of the A. F. of L., which reelected William Green as president, adopted a resolution assailing Mr. Williams and declaring it was "improper to appoint an individual to NRA whose public record showed him opposed to trade unions and to collective bargaining as set forth in section 7-a and 7-b of the NRA." The resolution asked President Roosevelt to investigate Mr. Williams' record, though it is doubted that the President thinks that is necessary.

#### Attitude of Organized Labor

But the attitude of organized labor promises to be a formidable factor in shaping NRA policies. Those of A. F. of L., who took control of the convention, and who forced the far reaching shift in policy of turning to the vertical union, undoubtedly believe this will give greater unity to the organization in pushing through its demands. On the other hand craft union advocates apparently think it will deprive A. F. of L. of cohesiveness. For it is well known that skilled workers in the ranks of organized labor do not take kindly to the idea of throwing in their lot with common labor. At least for the bulk of them, it is not a matter of "class consciousness" so much as of

its possible practical effect. Those taking this view feel that any boost in wages would through a vertical organization be more likely to go largely to unskilled labor. However, craftsmen are in the stronger tactical position to get the greater share of such an emolument, and especially so in periods of a scarcity of skilled labor. Such scarcity prevails in some lines even under existing conditions of widespread unemployment.

On the other hand, organized labor is represented as feeling that through vertical unionism it can put up a stronger and more united front on such matters as legislation. And having gone on record in favor of the 30-hr. week, the San Francisco convention made it clear it is going to drive hard for that goal at the next session of Congress. While heretofore it has been doubted that organized labor seriously expected to get through such legislation, the belief now is growing that it is seen as nearer a possibility if not a probability than heretofore. This is based on the feeling that the Congress to be elected next month will be the most radical, or certainly one of the most radical, on record, and that it will turn to the 30-hr. week and other related legislation. The White House is represented as being opposed to the 30-hr. week, just as are some of the most influential pro-labor daily papers of the country. Former NRA Administrator Hugh S. Johnson bitterly opposed it. Yet there is question as to whether such opposition as the White House might set up would stop the legislation. It is obviously a matter for the future to decide. Certainly there is no hesitancy in predictions, even by pro-labor supporters, that the five-day week and six-hr. day rigidly set by Federal law without reduction in wages would close down more industrial plants and bring about such widespread unemployment that by comparison the prevailing unemployment, tremendous as it is, would be mild. Recovery under such conditions would be impossible. It is believed organized labor officials, or some of the outstanding officials, clearly realize the fact but give lip service to the 30-hr. week as a matter of expedient labor politics.

The hour and wage problem is foremost among problems being considered by NRA, sharing importance with the matter of price fixing and production control.

#### No Rigid Rules Expected

Mr. Williams, at his first conference with the press last Friday, said none of these problems had been worked out. He stated there would be no sweeping or broad changes as to price control. This was only a restatement of what Mr. Richberg had previously made. He stated that as the problems arise they will be

given their "particular setting" by individual industries. The implication is that there will be no rigid rule as to price and production control, wages, and hours, but that instead different policies will govern different industries, being adjusted to the especial conditions in given industries. But it is the hope of the NLRB, Mr. Williams said, "to go as fast as it can and as soon as possible."

The mild-mannered Mr. Williams was more definite in speaking of enforcement. He said every effort would be used to "effect as good compliance as possible." His remarks were made at almost the same time President Roosevelt himself told of plans to speed up prosecution of code violators. So often, however, have plans been made for rigid enforcement only to prove futile that it probably will require real proof before they are taken at their face value. Never before have violations of codes been so widespread as at present. There are of course cases where the NRA or labor boards charge violations but they really are matters that rest upon court decisions; hence the growing number of NRA cases getting into the courts, with some hard blows for NRA, though with some which uphold it.

#### No Judicial Branch of NRA

The President also made known he had given up the idea of setting up a judicial branch of NRA. Thus another shift in policy, for recently it was stated that NRA would be built on the plan of the Federal Government itself, with an administrative, legislative and judicial branch. The "judicial" end now is going to be turned over to the Federal Trade Commission and the Department of Justice, and will work "hand in hand" to enforce trade practice provisions. The NRA, the President said, will continue to handle preliminary investigations of failure to adhere to codes. Consideration is being given to the idea of assigning to NRA an assistant attorney general to assist in these investigations. The President declared that experience has shown that about 95 per cent of compliance complaints can be settled without resorting to courts. Decision to push enforcement through the Federal Trade Commission and the Department of Justice instead of by setting up a "judicial branch" in NRA was reached at a conference between the President, Mr. Richberg, Attorney General Cummings and Chairman Garland S. Ferguson of the commission.

#### Spectacular Phase is Over

Meanwhile, Mr. Williams announced that the "glamorous and spectacular era" of NRA was at an end. NRA now has become a "work-

day job," the chairman said. Evidently seeking to justify the "glamorous and spectacular era" under the Johnson regime, Mr. Williams said it had its proper place in its first period of code making and educating the public to NRA. But now that the administration era has been reached it is the plan to make NRA more drab. The gold-fish bowl—always more of a phrase than a reality—probably will be even less conspicuous and NRA press conferences likely will be fewer and farther apart than in the past.

The White House order of last Friday fixing a 36-hr. week in the cotton garment industry, replacing the 40-hr. week, was given unusual significance in some quarters. This was because it was held to set a precedent for similar reduction in other industries and because the 36-hr. week has been pointed to as the mark to strike a compromise between the rather standard 40-hr. week and the 30-hr. week demanded by organized labor. While the order no doubt does carry significance, the fact remains that NRA proposes, as Mr. Williams said, to fix hours, etc., "industry by industry." Moreover, the President in giving out the order said he had no idea what might be done in the way of adjusting hours for other industries. The move, however, is looked upon as giving a strong lever to labor to make another drive for shorter hours in other industries. The order provides that there shall be no wage reductions. It was issued following adoption by the President of recommendations of a special committee. Manufacturers in the cotton garment industry promised some time ago to abide by the President's decision.

#### The Houde Case

The hesitancy of the Department of Justice to prosecute the Houde case, indeed its apparent plan to drop the case entirely, of course has aroused organized labor and it has pulled another shaft from its supply and fired it at the Department of Justice. The National Labor Relations Board also is seeking to get the Department to proceed in court with the case, and organized labor is endeavoring to supply the department with evidence of an "overt act" by the company in violation of Section 7-a. The department had stated it had no conclusive evidence upon which to proceed. The NLRB, in its decision, establishing the principle of majority representation, gave to the United Automobile Workers Federal Union at the Houde plant the exclusive right of collective bargaining. The company disregarded the ruling. The union officials are demanding this right.

The rather cautious attitude of the Department in going into court to enforce code compliance is said in

some legal quarters to be based on the belief that the Recovery act bears numerous phases that won't stand the judicial test. Some recent court actions are held to confirm the department in its attitude, notably the recent finding of a federal judge in Memphis, Tenn., that price fixing provisions of the lumber code are invalid.

#### Price Fixing Policy

It may be that NRA policy on price fixing will be held in abeyance, even as to "industry by industry" pending a report to the President on the subject by a Cabinet committee set up several months ago. The committee consists of Secretary of Labor Frances Perkins, Secretary of Commerce Roper, Secretary of Agriculture Wallace and Attorney General Cummings.

Also the Federal Trade Commission, which is to play an important part in enforcement, and which is well known for its unfriendly attitude toward the steel industry, is to make a report to the President on Dec. 1, along with a report from NRA on the much-reported-on basing point in the steel industry. The commission last spring made a report, making its usual strong attack on the basing point. Since that time there has been an expansion of basing points and just at this time the automobile industry—or rather that section of it in the Detroit area—is strongly insisting that Detroit be made a basing point. It is taken to be a foregone conclusion that the commission again will attack the basing point system, going as far no doubt as did the Darrow board. In the past Mr. Richberg, as NRA general counsel and administration member of the steel code, vigorously upheld the basing point system, though pointing out it was subject to adjustment. It remains to be seen what the new NRA board will do.

#### Loans for Heating and Sanitary Work Rising

WASHINGTON, Oct. 16.—That the American Radiator & Standard Sanitary Corp'n. has made 41 per cent more modernization and repairs loans in the past 43 days than it did in the entire year of 1933, and that the number of these loans made by the corporation are increasing at the rate of 20 per cent per week, were the high lights of a statement made to James A. Moffett, federal housing administrator, by Marshall Adams, director of sales and promotion for the company.

These loans are all made, Mr. Adams explained, under the Federal Housing Administration's modernization and repairs plan.

"Our company," he continued, "has

now 9299 contractors and dealers equipped to handle modernization and repairs loans, and there will be many more. The loans we are making average \$580, and those approved thus far total \$1,250,000. The number of property owners applying to us for loans are increasing with amazing rapidity. For example, each week's applications show an increase of 50 per cent over the applications of the preceding week throughout this 43-day period in which we have been making loans under the administration plan.

"We have approved, thus far, 75 per cent of all loan applications received, which fact is conclusive evidence that the highest type of citizen, whose credit standing is of the best, is out to take advantage of the opportunities offered by the Federal Housing Administration's installment buying plan. The loans we have made cover nearly 3000 jobs for heating, plumbing, sanitation and air-conditioning."

## No Early Purchases of Steel for Tree Belt

WASHINGTON, Oct. 16.—There will be no early requirements for large tonnages of wire fencing, barbed wire, and steel posts for the proposed 1000-mile tree belt between the Canadian border and the Texas Panhandle. F. A. Silcox, head of the Forest Service, announced last week that the project will not be undertaken unless it is authorized by Congress.

His decision, he stated, was the result of the recent ruling by Comptroller McCarl that only \$1,000,000 could be allocated for the work. The Comptroller held that the \$15,000,000 which had been allotted from the \$525,000,000 drought relief fund was contrary to the spirit of the act of Congress and that expenditure of more than a nominal sum was not authorized.

Preliminary work, however, is proceeding by the use of the \$1,000,000 and offices have been set up in Lincoln, Neb. Government sources had estimated that the project would call for 165,000 tons of wire fencing together with sizeable tonnages of barbed wire and steel posts.

Worthington Pump & Machinery Corp., Harrison, N. J., has acquired controlling interest in Carbondale Machine Co., Carbondale, Pa., manufacturer of air-conditioning equipment, refrigerating machinery, parts, etc., and will operate as a subsidiary. Plant will be continued temporarily at Carbondale and later removed to Harrison, where operations will be expanded.

## MAPI Head Criticizes Governmental Uncertainty—Flays Federal Competition

**A** DEFINITE commitment by the Federal Government that it has no intention of making any further inroads into the field of private business would undoubtedly see a sharp upbound in economic recovery," according to John W. O'Leary, president, Machinery and Allied Products Institute. "In our own particular field of activity," he said, "there is no doubt that fear of Government competition and the uncertainty of what Washington's next move will be have seriously retarded improvement."

"There is no denying that many of the measures incorporated in recent laws have been commendable but, as is always the case in a program of sweeping changes, the pendulum can sweep just too far the other way. One indication of this is the dire results that have followed the enactment of the Federal Securities Act. While it has its good points, the fact is that such far-stretched interpretations have followed that investors and business men have hesitated about putting any new money into business. Consequently, at least in the world of machinery manufacturers, without new and essential capital, many companies have been hard pressed to undertake much needed projects that would most certainly mean more productive activity and more employment."

### Newspaper Readers Conservative

Pointing to the survey recently conducted by the National Industrial Conference Board to ascertain the attitude of newspaper readers, and in which 5,050 representative newspapers cooperated, Mr. O'Leary said: "The answers of these 5,050 editors, who have a mass contact with 24,843,677 newspaper readers, indicate conclusively that the American public is still overwhelmingly conservative. The average citizen still is willing to earn what he wants, to recognize the need of fair profits and to frown on paternalism."

"Three questions asked by the National Industrial Conference Board brought an avalanche of replies that prove these points to a nicety. For instance, out of the 5,050 answers to the question, 'Does public opinion in your community favor control of the management of private business enterprises by Government bureaus or officials?', 4,563 of the editorial answers, or 93.6 per cent, were unqualified 'No's.' In like fashion, 86.9 per cent showed their readers against Government restrictions on the amount of goods to be produced by manufacturers; and 76.1 per cent showed opposition to any establishment by law of standards of private

business management to be enforced by judicial proceedings and court action."

These three current questions have been among the most serious deterrents to the recovery of the durable goods industries, Mr. O'Leary maintained. As long as the larger manufacturing and commercial institutions of the United States have a fear of Government restrictions and interference, they will postpone making any additions to plants or the replacement of obsolete machinery with the result that the machinery building companies will be that much farther handicapped in their own efforts to get back to normal outputs and normal working forces, he explained.

"Public opinion is most evidently against outright Federal competition with business," Mr. O'Leary continued. "Discussing this question, 94.9 per cent of the newspaper observers have shown their readers still sold on the old fashioned American theory of private business under private auspices; and 4,581 of these same commentators out of a total of 5,050 show the ordinary man and woman in their particular geographical areas still convinced that the hope of profits is essential to the progress of business enterprise."

### Oppose Compulsory Union Membership

Going into the question of Government and labor, Mr. O'Leary also insisted that American conservatism is again reflected in the fact that 94.1 per cent of the editors interviewed say their readers are averse to making membership in a labor union a necessary condition to employment, and that 75.8 per cent say their readers favor making sympathetic strikes and lockouts illegal.

"The real crux of the recovery problem is in durable goods and that, in turn, is traceable to the shrunken market for such products," Mr. O'Leary stated in conclusion. "Normally, the machinery builders and other allied interests of the country hire just about three times as many men as are on their payrolls right now. And, for every additional employee in their mills and factories, there is just that much more opportunity for the worker on raw material, on transportation, on sales and even in such distant fields as advertising."

"Restore some measure of confidence to the man who wants to remodel his factory and the investor who is willing to finance the bill, if assured only a strictly legitimate return on his savings, and there can be no doubt that our recovery trend must

be gradually but constantly upward. The durable goods requirements of the United States right now are so far behind what we all knew as normal in 1930 that, with any kind of assurance that would bring direct action, we would have enough busi-

ness to keep our mills and our workers occupied on a full day basis for at least the next seven or eight years. At least, it will take that much time to put the United States back on a 100 per cent efficient machine foundation."

## No Changes in Price Provisions of Steel Code Contemplated, Says Richberg

**N**O changes in the steel code which would affect prices are being considered, according to a statement by Donald R. Richberg, chief of the policy committee of the NRA, following a meeting of the board of directors of the American Iron and Steel Institute in New York last week.

The chief aim of the new NRA control is to promote stability and no policies affecting sudden and drastic changes in codes would be inaugurated, he said.

Mr. Richberg expressed satisfaction with the operation of the steel code and declared it "exceptional" as to compliance. The statement follows:

"I wanted to make it clear, in coming here, that I was still acting as the Administration's representative on the steel code. We had the usual discussions at the meeting, but there was no consideration of any change in the code. No changes in provisions of the code affecting prices or wages were discussed."

Asked if any recommendations were made about the ten-day interval between price filings and their effective dates, Mr. Richberg answered in the negative.

"I haven't made any recommendations in regard to the code and I don't think of making any. As a matter

of fact, the code is operating without any friction. The steel code is rather exceptional as to compliance."

"You were quoted recently as saying that the steel code required a lot of revision because of its complicated nature," Mr. Richberg was queried.

"I suggested the steel code as an example of a code developed by the industry and not by Washington. I was trying to make that clear as an answer to people who don't know what they are talking about—who speak as though the Administration had devised all these complications. In fact, Washington has tried to make all codes as simple as possible. The complications in the steel code were devised by the industry because it felt they were needed to protect it against unfair practices. The industry itself found it very necessary to do a thorough job of the code. The code has been operating very well and we have had good results in the way of maintaining increased employment and increased wages, despite ups and downs in steel production.

"The whole purpose of the present NRA reorganization is to create a sense of security and confidence in the way the Administration is operating. To turn that around into the idea that something new and drastic is going to develop is a mistake. We are working for stability."

be \$5,311,747. The total increase is estimated at \$172,345,371. The iron and steel and related lines, however, would find the heaviest increases in higher rates on raw materials, including bituminous coal, coke and iron ore. The carriers estimate that the increased revenue on these raw materials would be \$50,791,562, of which \$46,167,468 would fall on coal whose increase per net ton, it is estimated, would be 20c. A similar increase is estimated for coke, while for iron ore it is estimated at 16c. per gross ton. On iron and steel shipped sixth class the estimated increase would be 18c. per net ton, while on iron and steel shipped fifth class the estimated increase would be 1½c. per net ton.

Estimates as submitted to the commission are shown in table, tons originated and gross revenue being for 1933.

## Growth of New Government Agencies

The ramifications of the numerous Government agencies both in Washington and throughout the country created to deal with the problems of the depression and with the new policies developed by the present Administration are described in a book just published by the Brookings Institution entitled "New Federal Organizations, An Outline of their Structure and Functions," by Laurence F. Schmeckebier.

The book enumerates 46 major organizations and numerous subsidiary corporations created or greatly enlarged in scope between March 4, 1933, and June 30, 1934. These are officially entitled: administrations, bureaus, boards, establishments, commissions, committees, and corporations but are popularly known as the alphabetical groups.

It is pointed out that most of these organizations are engaged in work that has never been undertaken by the Federal Government including the making of loans to Government bodies, corporations, and individuals; the insurance of loans, deposits, and mortgages; the supervision of building associations, mortgage associations, and credit unions; the administration of a retirement system for railroad employees; the sale of electric current; the control of production of specified crops; the distribution of funds to the unemployed; the control of industry; the prevention of soil erosion; the control of the issuance of securities; and the regulation of stock exchanges.

While most of the new organizations are concerned with new policies, a few result from the normal growth of Government activities.

The book gives the scope of each unit, the reasons for its creation, the location of field offices, and a brief statistical measure of its activities.

## Proposed Freight Rate Increases Would Yield Large Revenues on Fuel and Ore

**W**ASHINGTON, Oct. 16.—Based on traffic of 1933, railroads estimate that additional gross revenue that would be derived

from shipments of pig iron and rolled steel if the Interstate Commerce Commission should grant the proposed 10 per cent rate advance would

	Tons Originated	Gross Freight Revenue	Estimated Revenue Increase per Net Ton	Estimated Increase in Revenue
Bituminous coal.....	230,837,339	\$508,116,843	20c.	\$46,167,468
Coke .....	9,173,480	18,023,237	20c.	1,834,696
Iron ore.....	26,525,789	31,412,457	16c.*	3,789,398
Pig iron.....	2,689,366	4,992,075	18c.	484,086
Iron and steel, 6th class in Official Classification, n. o. s.....	2,313,349	3,017,614	11c.	254,468
Rails, fastenings, etc.....	521,351	1,657,383	25c.	130,338
Cast iron pipe and fittings.....	422,038	2,703,597	35c.	147,713
Iron and steel pipe and fittings, n. o. s.....	1,533,046	12,220,685	1½c.	459,914
Iron and steel: nails and wire, not woven.....	1,040,130	6,107,521	1½c.	312,039
Iron and steel, rated 5th class in Official Classification, n. o. s. (also tin and terne plate).....	13,474,956	58,913,917	1½c.	4,042,487

\*Gross ton.

# Structural Steel Fabricating Code Is Stayed—Other Code Developments

**W**ASHINGTON, D. C., Oct. 16.—The National Industrial Recovery Board announced last week that operation of the code for the structural steel and iron fabricating industry had been stayed, pending the board's further order. The code was approved July 11, to become effective July 22. Successive orders were issued staying the code's operation until Aug. 16. The present order is retroactive to that date.

## ALLOY CASTINGS BUDGET

Objections or suggestions concerning the code authority budget or basis of contribution for the industry should be filed before Oct. 24 at room 4040, Department of Commerce Building. The budget total is \$27,303.48 for Feb. 4, 1934 to June 16, 1935. The basis of contribution is 69/100 of 1 per cent of twice the sales of the first six months of 1934 to cover the budget period of 71 weeks. This assessment is at the rate of  $\frac{1}{2}$  of 1 per cent per year.

## FILE MANUFACTURING

Approval by the National Industrial Recovery Board of a supplementary code for the file manufacturing industry, a division of the fabricated metal products manufacturing and metal finishing and metal coating industry, has been announced and becomes effective Oct. 19. The board has stayed until further order the provision prohibiting sales below cost except to meet competition and to dispose of dropped lines and seconds. The board also has ordered that the articles of association and by-laws be amended within 30 days to meet the board's requirements. The supplementary code includes provisions for price filing and defines unfair trade practices.

## ALUMINUM

The aluminum industry's code of fair competition has been extended for a further trial period of 90 days, during which operation of the pact will be observed further to determine whether its provisions are working in the public interest. The code originally was approved for a 90-day trial period on June 26. Under the administrative order of that date an investigation was required to be made into "the past practices of the industry and any modification of such practices or effect upon such practices resulting from the provisions of the code."

The investigation developed that, because the aluminum code authority was not recognized officially until Oct. 3, an adequate study of the effect of the code on past practices had been impossible.

## GRINDING WHEEL

Suggestions or objections to proposed amendments to the code for the grinding wheel industry, submitted by the code authority and the NRA, must be made to room 4327, Department of Commerce, before Oct. 20. The code authority proposes to add the following section to the definitions of unfair trade practice:

"Placing a consignment stock or stocks of any of the products of the industry with a consumer or with a machine manufacturer for resale."

NRA proposals include amendments to apply Department of Labor regulations to the employment of handicapped persons at below-minimum wages, and to require monthly payroll statements to the code authority, and to empower the code authority to submit health and safety standards to the National Industrial Recovery Board within a year of effective date of the code.

## CAP SCREW MANUFACTURING

The NIRE has approved the action of the supplementary code authority for the cap screw manufacturing industry, making 2 per cent the maximum cash discount which may be offered or allowed by any member of the industry. The 2 per cent limitation constitutes uniform credit terms for the industry.

## HACK SAW BLADES

The NRA has announced that objections or suggestions concerning a proposal to empower the code authority for the hack saw blade manufacturing industry, a division of the fabricated metal products industry, to prepare a code budget and basis of contribution, must be submitted to Deputy Administrator H. Ferris White, Room 507, 1518 K Street, N.W., Washington, before Oct. 24.

## ELECTRIC TOOLS

The proposed supplemental code for the electric tool industry was presented at a hearing before Assistant Deputy Administrator Sterling McKittrick on Oct. 10. The industry is a subdivision of the electrical manufacturing industry.

L. J. Walker of the Chicago Pneumatic Tool Co., chairman of the code committee, read a brief in support of the code. He said the industry embraced 60 manufacturers with a capitalization of \$12,100,000 in 1933 and sales of \$3,100,000 during the same year. He said that its business had suffered a very heavy decline from its peak of 1929. Those who proposed the supplemental code, he stated, represent substantially 80 per cent of the dollar volume of the industry. He said its business had been built up by elaborate and expensive study and development work and experimentation. Destructive competition had existed and it was the belief of those engaged in the industry that this would be largely eliminated by the adoption of the code, he said.

The proposed supplemental code would classify customers and products by a fixed system, allow varying discounts for differing classes of products and customers, provide price filing for products specified by a supervisory agency, define unfair trade practices, and incorporate the general labor and other provisions of the code for the electrical manufacturing industry.

No one appeared in person to oppose the code, but several letters from small concerns and specialty producers were read into the record by the assistant Deputy Administrator, expressing objections to the code in whole or in part.

One letter was from Forbes & Myers, electrical manufacturers, of Worcester, Mass.

They explained that they were small producers engaged in specialized orders and not competing with the larger concerns. They objected especially to the discount features of the code and also to the price filing sections, and asked that the code be rejected as a whole with such desirable features as it contains added to the basic code. The Milwaukee Electric Tool Corp. of Milwaukee wrote objecting to the supervising agency feature, and to the discount and selling below cost provisions, which, their letter said, placed the small manufacturer at a disadvantage. The automotive parts and equipment industry's code authority, in a letter, asked for amendments which would affect that industry.

Alvin M. Smith of Richmond, Va., representing the Southern Supply and Machinery Distributing Association, and H. R. Rinehart, assistant secretary and treasurer of the National Supply and Machinery Distributing Association, appeared in support of the supplemental code. They submitted letters from their respective organizations expressing the opinion that the code is essential to the welfare of their business.

Robert K. Lyle entered protest on behalf of the research and planning division of NRA to the entire set-up of the classification provisions of the code.

W. H. Edmonds, representing the consumers' advisory board, entered objections to the discount features as being contrary to the policy of the NRA.

Dan Boland, NRA legal adviser, questioned Mr. Walker at some length with respect to classifications and discounts. The code was taken under advisement at a post-hearing conference.

## ELECTRIC HOISTS

The NRA has extended the term of the temporary code authority for the electric hoist and monorail manufacturing industry for 30 days from Sept. 22. The extension was asked to permit election to the permanent code authority of a member representing non-members of the Electric Hoist and Monorail Manufacturers' Association.

## TRADE PRACTICE COMMITTEES

The NRA has announced approval of the plans and personnel of trade practice complaints committees, as follows:

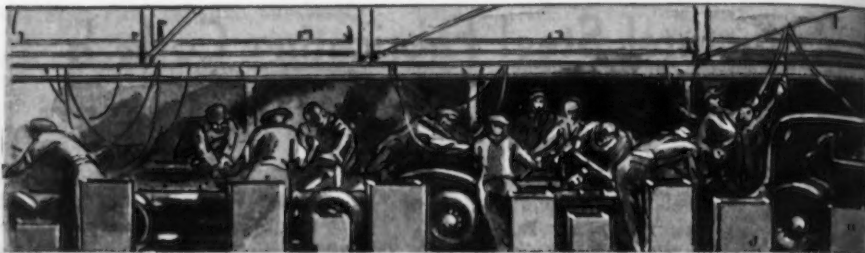
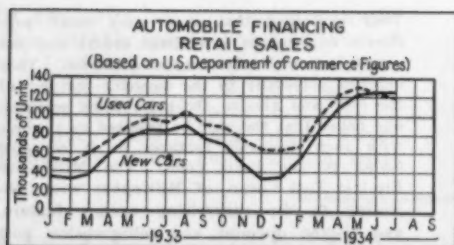
**Abrasive Grain Industry:** L. M. Fuller, American Abrasive Co., Westfield, Mass.; F. L. Degener, Jr., Keystone Emery Mills, Philadelphia, and W. A. Harty, Exolon Co., Blaisdell, N. Y.

**Alloy Casting Industry:** Glynne Morris, New York; J. D. Corfield, Michigan Steel Casting Co., Detroit; C. E. Malley, Ohio Steel Foundry Co., Springfield, Ohio; W. B. Sullivan, Michiana Products Co., Michigan City, Ind.; H. H. Harris, General Alloys Co., Boston; A. W. Daniels, American Manganese Steel Co., Chicago Heights, Ill.; W. C. Whyte, Electro-Alloys Co., Elyria, Ohio; W. H. Worrlow, Lebanon Steel Foundry, Lebanon, Pa.

**Bottling Machinery and Equipment Manufacturing Industry:** William A. Brown, Liquid Carbonic Corp., Chicago; F. E. Fusting, Crown Cork & Seal Co., Baltimore; J. C. McKenna, McKenna Brass & Mfg. Co., Pittsburgh; Eugene Sisson, Economic Machinery Co., Worcester, Mass.; Henry Scarborough, Twentieth Century Machinery Co., Milwaukee, and Louis B. Montfort, Washington, D. C.

**Railway and Industrial Spring Subdivision of Machinery and Allied Products Industry:** Edgar E. Brosius, administration member, Edgar E. Brosius, Inc., Pittsburgh; A. S. Henry, American Locomotive Co., New York; H. C. Bughman, Jr., Union Spring & Mfg. Co., New Kensington, Pa.; F. K. Metzger,

(Concluded on Page 60)



## THIS WEEK ON THE

# Pick-Up in Steel Buying by Motor Car Makers Will Be Slow

DETROIT, Oct. 16.

**W**ITH the end of the 1934 production season at hand, a survey of the automobile industry reveals many interesting shifts in sales positions and explains why car manufacturers have made certain moves in the last few months. This survey is based on domestic registrations during the first eight months of this year, the latest period for which complete figures are available. It is believed that the sales reports for the final four months of 1934 will not alter materially the relative positions of the various companies.

The demand for passenger cars and trucks has greatly exceeded that in 1933, although the latter have made much more spectacular gains than the former. While passenger cars were registering an increase of 35 per cent, trucks were more than doubling that figure, with an improvement of 78 per cent. Whereas passenger cars attained their sales peak for the year in June, trucks didn't reach their highest point until August. Recent sizable orders from various departments of the Federal Government, particularly the War Department, which is in the midst of a motorization program, may further improve the standing of truck companies as against passenger car makers.

This sharp rise in truck sales has largely benefited three companies. Ford leads the field with a gain of 49,895 units, Chevrolet is second with 40,935 units, and Dodge third with 18,493 units. Thus Ford, Chevrolet and Dodge have accounted for 109,323 out of the 120,763 units by which truck sales this year have exceeded those of last year. If one looks at the matter solely from the standpoint of percentage rather than number of units, Dodge is in the lead with an increase

of 150 per cent compared with 129 per cent for Ford. However, Chevrolet still is in first place in volume of sales, with 107,420 units, as against 88,050 by Ford.

### Ford Is Star Performer

It is in the passenger car market that Ford has been the star performer. Here it can sing a song of victory as the result of a remarkable comeback. From January to August inclusive, it sold 203,990 more V-eights than it did in the similar months of the previous year. This represented 64 per cent of the increase in sales for the entire passenger car industry. It gave Ford this year 29 per cent of the industry's sales; a year ago it was struggling desperately to hold 20 per cent of the market.

This spectacular showing has been made by Ford at the expense of Chrysler as well as General Motors. Last year (again confining comparisons to the first eight months) General Motors supplied 45 per cent of the total passenger cars sold in the United States. This year its proportion retreated to 39 per cent. Even Chrysler Corp., despite its substantial expansion in sales, has not advanced its position in the industry this year. Last year it registered 24 per cent of all the cars sold at retail and this year 23 per cent. The story would have been a different one if the Chrysler and De Soto divisions had kept pace with Plymouth and Dodge instead of giving ground.

As to the Big Three (General Motors, Ford and Chrysler), they are making it tougher for the opposition all the time. They have sold 91 per cent of the passenger cars in the domestic market in 1934, as against 90 per cent last year. Measured in

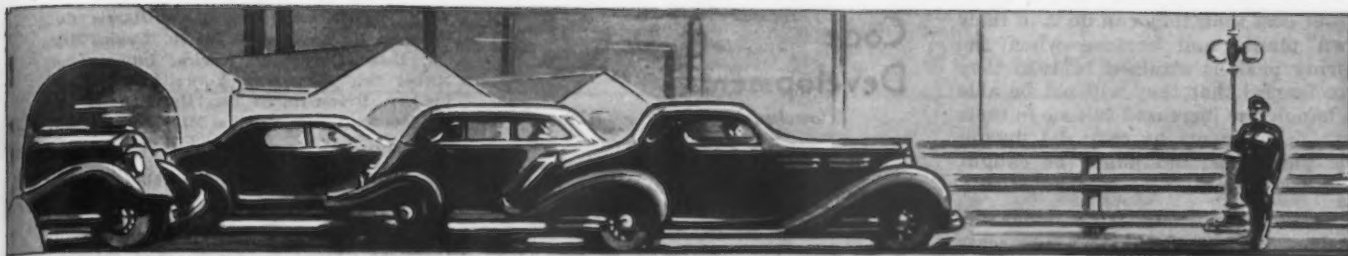
the number of units gained over last year, they accounted for 94 per cent. No wonder, then, that the small independent makers are looking around wildly in an effort to grasp some straw to save them from being inundated.

### Low-Priced Cars Make Gains

Most of the industry's progress this year has been in the lowest-price field, being made by Ford, Chevrolet and Plymouth. These three companies have sold 1,043,347 passenger cars, compared with 727,489 cars in the same months of 1933. This is an increase of 315,858 units, or 43 per cent, and represents 82 per cent of the total gain made by the industry.

In the medium-price field 14 car makers made retail deliveries of 333,601 cars, whereas last year their sales amounted to 272,665 cars. The increase, therefore, was 22 per cent, or about one-half that achieved by low-price car manufacturers. The upward sweep of the sales curve, however, was far from being uniform among medium-price car companies. Three makers scored heavy gains, totaling 49,648 units out of the 60,936 units in their field. Oldsmobile was far out in front, having sold 26,014 more cars than in 1933. Hudson was second with a 12,327-car improvement and Dodge third with 11,307 cars. Five out of the 14 companies (Pontiac, Chrysler, De Soto, Hupmobile and Auburn) sold fewer cars this year than last.

It is perhaps significant that all five of the companies which failed to equal last year's record are doing something to remedy the situation. Pontiac is adding a six to its line of eights. Chrysler is reported to be changing somewhat the front-end appearance of the Airflow to meet criti-



# ASSEMBLY LINE

cisms of the buying public. De Soto is said to be about ready to restore a model of conventional design to its line, thus supplementing its series of Airflow cars. Hupmobile has a tentative deal with Willys-Overland to take a certain volume of small Willys cars to augment the volume handled by dealers and thus strengthen its dealer set-up. It likewise is going through the throes of a managerial shake-up. Roy Faulkner recently returned to Auburn as active head of that company and has begun a rehabilitation program.

In justice to the Pontiac company it should be stated that the chief job of H. J. Klingler as president this year has not been to secure enormous volume, but to put the Pontiac dealer organization on a basis where it was proving more profitable for individual dealers. Mr. Klingler, in achieving this objective, has made an admirable success of his first year at the Pontiac helm.

## Quality Cars Have Hard Struggle

Manufacturers of quality cars have had an uphill struggle against the trend toward lower-price vehicles, with the result that from Jan. 1 through August they sold at retail 14,546 units, as against 14,891 units in the corresponding months of 1933. The loss was only 345 units, but the showing was hardly encouraging in view of the fact that total automobile sales have turned sharply upward this year. Packard, La Salle, Cadillac, Lincoln and Pierce-Arrow have been considered in this tabulation. The Cadillac-La Salle division of General Motors made the best showing, with an increase of 1777 units, of which 1148 were La Salles. It was style leadership, combined with the lowering of the price, that enabled La Salle to lead the field.

Ford's resumption of operations on a five-day basis was responsible for expansion of car assemblies the past week. However, it is believed that the industry will do well if it turns out 120,000 units this month. November output is expected to be little better than that in October, and possibly may be lower.

Automotive plants are operating intermittently. Chevrolet and Ford con-

tinue to be the chief support of current output. Oldsmobile has about completed its run on 1934 models. Buick and Pontiac have been down, while Cadillac-La Salle have again started assemblies on a small scale. The Dodge truck plant is the only division of Chrysler Corp. now active in assembling cars. Plymouth is reported to have resumed work in certain departments for the purpose of accumulating a bank of parts to be ready when assemblies of new cars get under way around Nov. 1. Briggs has begun making body stampings for the new Plymouth. Incidentally, Briggs has a considerably larger contract from Chrysler Corp. for 1935 than during the past year. This is responsible for the addition to the Mack Avenue plant recently finished by Briggs.

## Ford Likely to Buy Steel

Steel releases by the automotive industry have sunk to one of the lowest points of the year, but the latter half of the month should bring some measure of recovery. Ford is likely to make a steel buy before the month is out. Chrysler too should give moderate-size releases shortly. Purchases by General Motors probably will be meager for several more weeks. Even if the highest hopes of the steel people materialize before the end of the month, the steel tonnage placed will not be much in volume. November should tell a better story, but even then the size of the tonnage is debatable. A slow, steady pick-up in steel buying is anticipated, but it will not attain sufficient proportions this year to get the steel industry unduly excited.

If present plans are carried out, it appears that Chevrolet will have a steel roof made from a single sheet in 1935. Means apparently have been found to deaden the noise satisfactorily. This development will add greatly to the safety of automobiles, since the top at present is a car's most vulnerable spot. It is possible

that some other General Motors cars also may have an all-steel roof. Two or three companies outside General Motors are experimenting with this new type of roof.

## Automobile Foundries Speeding Up

Forecasting an early expansion in motor car assemblies, automotive foundries are increasing their melt. In the first half of October they took in almost as much pig iron as during the entire month of September. The Dodge foundry, making heavy castings for Chrysler divisions, resumed work this week following several weeks of idleness. Another foundry likewise has started production again presumably on Chrysler orders.

Campbell, Wyant & Cannon, at Muskegon, are running three days a week and the Lakey Foundry in that city is said to have received releases for 2000 cylinder blocks for Chrysler cars and for 100,000 clutch castings for the new V-eight Ford. The foundry of Studebaker Corp. at South Bend, now closed, will not reopen until after Nov. 1.

Michigan Malleable, in Detroit, has increased its output recently with Ford business understood to be the mainstay of its production. Ford is reported to have given initial releases for front axles and certain other parts for its 1935 cars, although purchase of parts is yet to be completed. Plans for launching operations on the new Ford around Nov. 1 have not yet been changed. Chevrolet, on the other hand, will not get new model production under way until about Dec. 1.

Chrysler apparently has the edge at the moment so far as winning the race to be the first major manufacturer out with new models. It is said that the Plymouth and Dodge in their front end design will resemble somewhat the LaSalle. The conventional De Soto to be added to the Chrysler line in 1935 will have the Dodge six-cylinder engine according to current reports.

What little support the steel market is getting from the automobile industry is coming from Chrysler and Ford. Certain automobile companies are placing more business with parts makers the coming year, because they can have the work done outside at a

lower cost than they can do it in their own plants and because when the spring peak is attained in 1935 they are fearful that they will not be able to handle the increased volume in their own departments as they did during the past year and might be caught in a costly jam.

Still another factor is the labor situation. With parts manufacture scattered among a number of suppliers around the country there is less likelihood of a tie-up through labor trouble than if all operations are concentrated in one automotive plant. Commercial car and truck production continues one of the main supports of the market at the moment. Dodge Brothers has received additional orders for trucks from the Federal Government. Its fourth quarter output of trucks will be the largest in several years. Chevrolet's current assemblies consist almost entirely of standard passenger cars and trucks. Federal Motor Truck Co. is engaged in filling a \$1,000,000 order for the United States War Department.

#### Detroit Notes

It is understood that Pontiac's forged crankshaft will be made by a Harvey, Ill., company. This supplier likewise is reported to have received a contract for Dodge crankshaft forgings for the coming year. . . . The Leaf Spring Institute has opened an engineering office at 417 Stormfultz-Lovely Building, 7310 Woodward Avenue, Detroit, with Karl Probst, consulting engineer, in charge. The executive offices will remain at 2250 East Grand Boulevard, Detroit. J. H. Shoemaker is managing director of the institute. . . . Charles B. Bohn, president Bohn Aluminum & Brass Corp., predicts the time is not far distant when high-priced cars will be made of light materials, preferably aluminum. Through superior body design, these cars will be roomier and will offer more comfort than today's cars. Engines will have speeds of 4500 to 5000 r.p.m., thus developing tremendous torque at all speeds. . . . It is reported that the Eaton Mfg. Co. and General Spring & Bumper Co. will furnish bumpers to Pontiac the coming year. Pontiac's bumpers have been made recently in the Chevrolet bumper plant in this city. . . . McKinnon Industries division of General Motors of Canada is constructing an addition to its foundry at Saint Catharines, Ont. . . . Bare fists are taking the place of kid gloves in the advertising copy among low-price car makers. Referring to a leading competitor, Ford newspaper advertising delivers this haymaker, "Ford makes only one car. We have no smaller car to make you think we have a lower price. We do not show you the picture of a large car and print the price of a smaller car. The car we advertise is the car we sell." . . . Packard is understood to have placed some tool and die business for its lighter car.

## Code Developments

(Concluded from Page 57)

**Standard Steel Works Co.,** Burnham, Pa.; **A. H. Peycke,** American Steel Foundries, Chicago; **Harry Wilson,** American Spiral Spring & Mfg. Co., Pittsburgh; **H. S. Sherman,** Fort Pitt Spring Co., Cleveland, and **H. A. Noble,** Pittsburgh Spring & Steel Co., Pittsburgh.

**Die Casting Manufacturing Industry:** **F. P. Assmann,** Precision Castings Co., Inc., Syracuse, N. Y.; **H. H. Doehler,** Doehler Die Casting Co., Toledo; **G. M. Rollason,** Aluminum Co. of America, Garwood, N. J.; **H. H. Weiss,** Superior Die Casting Co., Cleveland; **S. A. Hellings,** Stewart Die Casting Corp., Chicago; **W. D. Ward,** administration member, New York, all code authority members.

**Steel Package Manufacturing Industry:** **One-man committee,** D. S. Hunter, Cleveland.

**Canning and Packing Machinery Equipment Industry:** **John G. Allbright,** Allbright-Nell Co., Chicago; **Lee W. Duer,** Elgin Mfg. Co., Elgin, Ill.; **Frank D. Chapman,** Berlin-Chapman Co., Berlin, Wis.; **Ogden S. Sells,** San Jose, Cal., and **W. E. Nicholoy,** Scott-Viner Co., Columbus, Ohio, all code authority members.

**Metal Lath Manufacturing Industry:** **C. F. Henning,** United States Gypsum Co., Chicago; **J. Kahn,** Truscon Steel Co., Youngstown; **W. G. Hurlbert, Jr.,** Bostwick Steel Lath Co., Niles, Ohio.

**Nickel and Nickel Alloys Industry:** **John F. Thompson,** International Nickel Co., Inc., New

York; **Frank L. Driver,** Driver-Harris Co., Harrison, N. J.; **Albert M. Marsh,** Hoskins Mfg. Co., Detroit; **Paul D. Merica,** International Nickel Co., Inc., New York; **Frederick V. Lindsey,** Driver-Harris Co., Harrison, N. J.; **William B. Little,** Hoskins Mfg. Co., Detroit.

#### CODE AUTHORITIES NAMED

The NRA has announced the following code authority memberships:

**Stone Finishing Machinery and Equipment Industry:** **Charles G. Eckles,** sales manager of **George W. Smith Woodworking Co.,** Philadelphia, administration member of the code authority.

**Secondary Steel Products Warehousing Trade:** **Charles K. Bardes** of the **Brooklyn Steel Co.,** to the code authority to represent members of the trade not members of the National Association of Distributors of Secondary Steel Products.

**Oil Field Pumping Engine Manufacturing Industry,** division of machinery and allied products industry: **Prof. Henry P. Dutton,** administration member without vote. Professor Dutton has been instructor and professor of factory management at Northwestern University and since 1927 associate editor for the McGraw-Hill Publishing Co.

**Cast Iron Soil Pipe:** **W. J. Kirby,** Somerville Iron Works, Somerville, N. J.; **George A. Harder,** Central Foundry Co., New York; **William A. Brecht,** Hajoca Corp., Philadelphia; **C. A. Hamilton,** Alabama Pipe Co., Anniston, Ala.; **Wm. H. Deyo,** Anniston (Ala.) Foundry Co.; **James R. Hedges,** Hedges-Walsh-Weidner Co., Chattanooga, Tenn.; **Joe H. Gardner,** Bingham & Taylor Corp., Buffalo, N. Y.

## OBITUARY

**CARL V. DODGE,** who had been a vice-president of United Engineering & Foundry Co., since May, 1932, died at Pittsburgh on Oct. 16 after a short illness. He entered the employ of the United company in 1904 as a shipping clerk in the chilled roll department at Vandergrift, Pa. He later served as foreman of the cleaning floor and order clerk, and in 1913 was transferred to the Pittsburgh office as a steel casting and roll salesman. During the world war he headed the steel castings sales department of the company.



C. V. DODGE

When the casting and roll sales departments were consolidated in 1921, he became assistant manager of sales, a position he held until the death of William Gardner in 1931, when he was made general manager of roll and casting sales.

♦ ♦ ♦

**FRANKLIN M. BOWMAN,** who for the past 22 years has been vice-president of Blaw-Knox Co., Blawnox, Pa., died suddenly at his Pittsburgh home on Oct. 12. He was born at Freeport, Waterloo County, Canada, and was 60 years of age. He became associated with the Riter-Conley Mfg. Co., Pittsburgh, in 1891, later becoming director and secretary. He joined the Blaw Steel Co. as director and secretary in 1912, retaining those offices when the company became the Blaw-Knox Co.

♦ ♦ ♦

**JAMES W. RAWLE,** vice-president of the J. G. Brill Co., Philadelphia, died at his home at Lansdowne, Pa., on Oct. 4, after a long illness. He became identified with the steel industry in 1899 as a day laborer with the Bethlehem Steel Co. and worked up through the various departments to the position of assistant to the president. He resigned in 1906 to enter the employ of the Brill company as assistant general manager. In 1914 he was appointed general manager and in 1926 was made vice-president.

## SUMMARY OF THIS WEEK'S BUSINESS

# Steel Production Drops a Point But Sentiment Improves

### Clarification of Administration Policy Steadies the Market—New Wave of Replenishment Buying Looked For—Scrap Unchanged

**S**TEEL production has suffered a setback, declining from  $24\frac{1}{2}$  to  $23\frac{1}{2}$  per cent of capacity. The recession is apparently an aftermath of uncertainties regarding Administration policies which have now been largely removed. The atmosphere has been cleared of much doubt and confusion not only by the growing tone of conservatism manifested by the new NRA as it attempts to get its bearings, but more especially by the unequivocal assurance of Donald Richberg that no changes in the price provisions of the steel code are contemplated. His emphasis on the need for stability in the steel industry was timely in view of the close relationship that exists between price levels and wage rates. Even though the danger of price demoralization now seems to have been forestalled, it is a question how long present wages can be maintained if business volume does not increase. Greater confidence, now seemingly in the making, may, of course, provide the needed impetus to lagging enterprise.

**P**ENDING the translation of better sentiment into greater demand, the iron and steel market remains lethargic. Steel bookings from the automotive industry have sunk to one of the lowest levels of the year. Virtually the only sign of betterment is the release of inquiries for stampings for new models, which may shortly result in orders for sheets and strip steel. Ford has resumed operations on a five-day basis, but automobile output for the month will probably not exceed 120,000 units and November gives promise of little, if any, improvement. The steel trade still clings to the hope, however, that substantial buying of steel for new models will develop by the end of this month.

**A**N earlier and sharper stimulus to buying is more likely to result from the exhaustion of speculative inventories accumulated by consumers in the second quarter. With the apparent removal of incentives to wait out the market, buyers are counted on to replenish their stocks more freely and evidences of a nascent restocking movement are seen in a growing diversification of orders. Renewed demand from jobbers is regarded as particularly significant. Eastern mills are receiving their first orders from Pacific Coast warehouses since last June. Pipe jobbers' requirements are being increased by the drafts on them by the Administration's home modernization program.

Farm equipment makers are taking more steel, now being the leading consumers of bars in the Middle

West. Steam shovel makers are also busier following the receipt of orders for public projects.

**D**EMAND for heavier rolled products is still mainly dependent on Government expenditures. Structural steel awards, at 8580 tons, compare with 15,700 tons in the previous week and 15,850 tons two weeks ago. New projects total 14,302 tons as against 6400 tons reported last week. Plate lettings were 2200 tons, with fresh inquiries calling for 2440 tons.

The steel for an Argentine refinery of an American company, amounting to 12,000 tons, has been placed with a German mill. The oil company had blocked marks in Germany and could not get them out except in trade.

Most railroads are curtailing their expenditures, but a number of Western roads are preparing rail specifications, which suggests that another Government-sponsored rail buying program is being launched. The reequipment of 2,000,000 freight cars with a new type of air brake over a period of ten years promises to benefit foundries, as well as bolt and nut makers.

**T**IN plate production has finally yielded to seasonal influences and has declined from 45 to 40 per cent. Not only has domestic demand receded but foreign business has slumped following heavy purchases on successive price increases. The last advance in the export price was from approximately \$4.33 to around \$4.40 per base box, Pittsburgh. Japan continues to be a large buyer of tin plate waste wasters. Reports that the Japanese Government will import 100,000 tons of various types of steel for the reconstruction of the typhoon-swept Osaba district still lack official confirmation.

Scrap markets are without trend and THE IRON AGE composite price for heavy melting steel remains unchanged at \$9.50 a ton for the fourth week. THE IRON AGE composites for finished steel and pig iron are also unaltered at 2.124c. a lb. and \$17.90 a ton respectively. Bolts, which are not under a code, have weakened again and are now quoted at 70, 10, 10 and 10 per cent off list.

Steel production is off two points to 24 per cent at Chicago and 10 points to 23 per cent in the Wheeling district, but has risen two points to 28 per cent in the Valleys, two points to 26 per cent at Cleveland and one point to 22 per cent in the Philadelphia area. Elsewhere operations are substantially unchanged.

# ▲ ▲ ▲ A Comparison of Prices ▲ ▲ ▲

Market Prices at Date, and One Week, One Month, and One Year Previous  
Advances Over Past Week in Heavy Type, Declines in Italics

## Pig Iron

	Oct. 16, 1934	Oct. 9, 1934	Sept. 18, 1934	Oct. 17, 1933
<i>Per Gross Ton:</i>				
No. 2 fdy., Philadelphia.....	\$20.26	\$20.26	\$20.26	\$18.26
No. 2, Valley furnace.....	18.50	18.50	18.50	17.50
No. 2 Southern, Cin'tl.....	19.13	19.13	19.13	18.13
No. 2, Birmingham.....	14.50	14.50	14.50	13.50
No. 2 foundry, Chicago*.....	18.50	18.50	18.50	17.50
Basic, del'd eastern Pa.....	19.76	19.76	19.76	17.76
Basic, Valley furnace.....	18.00	18.00	18.00	17.00
Valley Bessemer, del'd P'gh..	20.76	20.76	20.76	19.76
Malleable, Chicago*.....	18.50	18.50	18.50	17.50
Malleable, Valley.....	18.50	18.50	18.50	17.50
L. S. charcoal, Chicago.....	24.04	24.04	24.04	23.54
Ferromanganese, seab'd car- lots .....	85.00	85.00	85.00	82.00

\*This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.

\*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

## Finished Steel

	Oct. 16, 1934	Oct. 9, 1934	Sept. 18, 1934	Oct. 17, 1933
<i>Per Lb.:</i>				
Hot-rolled annealed sheets, No. 24, Pittsburgh.....	2.40	2.40	2.40	2.25
Hot-rolled annealed sheets, No. 24, Gary.....	2.50	2.50	2.50	2.35
Sheets, galv., No. 24, P'gh...	3.10	3.10	3.10	2.85
Sheets, galv., No. 24, Gary...	3.20	3.20	3.20	2.95
Hot-rolled sheets, No. 10, P'gh	1.85	1.85	1.85	1.75
Hot-rolled sheets, No. 10, Gary	1.95	1.95	1.95	1.85
Wire nails, Pittsburgh.....	2.60	2.60	2.60	2.10
Wire nails, Chicago dist. mill	2.65	2.65	2.65	2.15
Plain wire, Pittsburgh.....	2.30	2.30	2.30	2.10
Plain wire, Chicago dist. mill	2.35	2.35	2.35	2.15
Barbed wire, galv., P'gh.....	3.00	3.00	3.00	2.60
Barbed wire, galv., Chicago dist. mill.....	3.05	3.05	3.05	2.65
Tin plate, 100 lb. box, P'gh..	\$5.25	\$5.25	\$5.25	\$4.65

## Scrap

<i>Per Gross Ton:</i>				
Heavy melting steel, P'gh...	\$10.25	\$10.25	\$10.75	\$11.75
Heavy melting steel, Phila...	9.50	9.50	9.50	10.25
Heavy melting steel, Ch'go...	8.75	8.75	8.50	9.62 1/2
Carwheels, Chicago.....	9.50	9.50	9.50	10.00
Carwheels, Philadelphia.....	11.25	11.25	11.25	11.75
No. 1 cast, Pittsburgh.....	11.25	11.25	11.75	11.75
No. 1 cast, Philadelphia.....	11.75	11.75	11.75	11.50
No. 1 cast, Ch'go (net ton)...	8.00	8.00	8.00	10.00
No. 1 RR. wrot., Phila.....	11.25	11.25	11.25	11.00
No. 1 RR. wrot., Ch'go (net)	7.00	7.00	6.75	8.50

## Coke, Connellsville

<i>Per Net Ton at Oven:</i>				
Furnace coke, prompt.....	\$3.85	\$3.85	\$3.85	\$3.75
Foundry coke, prompt.....	4.60	4.60	4.60	4.25

## Metals

<i>Per Lb. to Large Buyers:</i>				
Electrolytic copper, refinery...	8.75	8.75	8.75	7.50
Lake copper, New York...	9.12 1/2	9.12 1/2	9.12 1/2	8.00
Tin (Straits), New York....	50.95	50.75	51.37 1/2	46.75
Zinc, East St. Louis.....	3.80	3.87 1/2	4.00	4.75
Zinc, New York.....	4.15	4.22 1/2	4.35	5.12
Lead, St. Louis.....	3.45	3.45	3.55	4.10
Lead, New York.....	3.60	3.60	3.70	4.25
Antimony (Asiatic), N. Y....	9.50	9.00	8.75	6.87 1/2

## Rails, Billets, etc.

<i>Per Gross Ton:</i>				
Rails, heavy, at mill.....	\$36.37 1/2	\$36.37 1/2	\$36.37 1/2	\$40.00
Light rails, Pittsburgh.....	35.00	35.00	35.00	32.00
Rerolling billets, Pittsburgh.	27.00	27.00	27.00	26.00
Sheet bars, Pittsburgh.....	28.00	28.00	28.00	26.00
Slabs, Pittsburgh.....	27.00	27.00	27.00	26.00
Forging billets, Pittsburgh...	32.00	32.00	32.00	31.00
Wire rods, Pittsburgh.....	38.00	38.00	38.00	35.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb..	1.70	1.70	1.70	1.60

## Finished Steel

<i>Per Lb.:</i>				
Bars, Pittsburgh.....	1.80	1.80	1.80	1.75
Bars, Chicago.....	1.85	1.85	1.85	1.80
Bars, Cleveland.....	1.85	1.85	1.85	1.80
Bars, New York.....	2.13	2.13	2.13	2.08
Plates, Pittsburgh.....	1.80	1.80	1.80	1.70
Plates, Chicago.....	1.85	1.85	1.85	1.75
Plates, New York.....	2.08	2.08	2.08	1.98
Structural shapes, P'gh.....	1.80	1.80	1.80	1.70
Structural shapes, Chicago...	1.85	1.85	1.85	1.75
Structural shapes, New York.	2.05 1/4	2.05 1/4	2.05 1/4	1.95 1/4
Cold-finished bars, P'gh.....	2.10	2.10	2.10	1.95
Hot-rolled strips, Pittsburgh.	1.85	1.85	1.85	1.75
Cold-rolled strips, Pittsburgh.	2.60	2.60	2.60	2.40

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables. †Blue Eagle copper.

# ▲ ▲ ▲ The Iron Age Composite Prices ▲ ▲ ▲

## Finished Steel

Oct. 16, 1934	2.124c. a Lb.
One week ago	2.124c.
One month ago	2.124c.
One year ago	2.015c.

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.

	HIGH	LOW
1934 .....	2.199c., April 24;	2.008c., Jan. 2
1933 .....	2.015c., Oct. 3;	1.867c., April 18
1932 .....	1.977c., Oct. 4;	1.926c., Feb. 2
1931 .....	2.037c., Jan. 13;	1.945c., Dec. 29
1930 .....	2.273c., Jan. 7;	2.018c., Dec. 9
1929 .....	2.317c., April 2;	2.273c., Oct. 29
1928 .....	2.286c., Dec. 11;	2.217c., July 17
1927 .....	2.402c., Jan. 4;	2.212c., Nov. 1

## Pig Iron

\$17.90 a Gross Ton
17.90
17.90
16.61

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	HIGH	LOW
1934 .....	17.90, May 1;	16.90, Jan. 27
1933 .....	16.90, Dec. 5;	13.56, Jan. 3
1932 .....	14.81, Jan. 5;	13.56, Dec. 6
1931 .....	15.90, Jan. 6;	14.79, Dec. 15
1930 .....	18.21, Jan. 7;	15.90, Dec. 16
1929 .....	18.71, May 14;	18.21, Dec. 17
1928 .....	18.59, Nov. 27;	17.04, July 24
1927 .....	19.71, Jan. 4;	17.54, Nov. 1

## Steel Scrap

\$9.50 a Gross Ton
9.50
9.58
10.54

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	HIGH	LOW
1934 .....	13.00, Mar. 13;	9.50, Sept. 25
1933 .....	12.25, Aug. 8;	6.75, Jan. 3
1932 .....	8.50, Jan. 12;	6.42, July 5
1931 .....	11.33, Jan. 6;	8.50, Dec. 29
1930 .....	15.00, Feb. 18;	11.25, Dec. 9
1929 .....	17.58, Jan. 29;	14.08, Dec. 3
1928 .....	16.50, Dec. 31;	13.08, July 2
1927 .....	15.25, Jan. 11;	13.08, Nov. 22

# Sentiment Improves More Than Business at Pittsburgh



**Local Output Unchanged at 16 Per Cent  
—Valley Operations Up Two Points to 28  
Per Cent—Wheeling Rate Off Ten Points**

**P**ITTSBURGH, Oct. 16.—The only yardstick for measuring improvement in this district is sentiment. Bookings in the first half of October, while running ahead of those at mid-September, still fall short of representing a seasonal bulge in steel buying. Nevertheless producers are encouraged by a growing interest in finished steel that is expected to result soon in broader buying. The chief retarding influence to activity at the moment is the lack of automotive tonnage, which is being restricted to fill-in lots. The local steel fraternity is clinging to the hope that large scale buying for new model requirements will put in its expected appearance by Nov. 1.

Despite the low aggregate volume of miscellaneous steel buying, encouragement is found in the unusually general character of consumer needs. Another point in favor of increased buying is that consumers have been liquidating finished steel stocks over a three and one-half month period. Jobbers' stocks, moreover, are moving with more freedom and heavier replenishment orders are in prospect, particularly for standard pipe.

With actual steel demand drifting, raw steel output in the Pittsburgh district is unchanged this week at 16 per cent of capacity. Increased business in the Valleys and nearby northern Ohio districts has boosted production there two points to 28 per cent. In the Wheeling district output has slumped 10 points to 23 per cent.

The plan of railroads to reequip 2,000,000 freight cars with a new type of air brake will probably benefit pig iron producers and bolt and nut makers in this district.

Tin plate production has finally yielded to seasonal influences and this week is lower at 40 per cent.

## Pig Iron

Prospects for a fairly heavy demand for malleable pig iron are founded on the program for reequipping 2,000,000 freight cars with a new type of air brake. Since a large share of the work will be done in this district, pig iron producers here will probably benefit measurably. Meanwhile, carlot buying is brisker, but in no direc-

tion does business approach significant proportions. Large consumers continue to draw from heavy stocks acquired in the second quarter and show no interest in the present market. Prices appear to be steady. Pressure from large buyers for lower prices has been unavailing. Pig iron producers, though admitting an extreme need for backlog tonnage, are apparently not willing to invite large-scale buying by revising present quotations, at least for the time being.

## Semi-Finished Steel

Detached mills are not manifesting any greater interest in semi-finished steel. Sheet bar demand from tin plate mills is losing ground, while the movement to sheet mills is lagging. A pick-up in demand from finishing mills is expected to accompany expanding automotive demand late this month. Skelp is holding its own, although aggregate demand is relatively limited.

## Railroad Equipment

Of chief importance in this field is the plan of the railroads to reequip 2,000,000 freight cars with a new type of air brake developed by the Westinghouse Air Brake Co., Wilmerding, Pa. The program, sponsored by vote of the carriers, will entail an expenditure of \$145 for each pair of brakes, or \$29,000,000 annually if the present goal of 200,000 freight cars a year is reached. It is believed, however, that the program will be launched very slowly, since the financial condition of the carriers, as a whole, has certainly fostered deliberative policies covering expenditures. The Standard Tank Car Co., Sharon, Pa., subsidiary of the General American Tank Car Corp., has received orders for 75 tank cars and 40 individual tanks.

## Bolts, Nuts and Rivets

Specifications on fourth quarter contracts diminished in the past week. On Navy bids opened last week the leading producer is low bidder for some grades, but no awards have been announced. The 10-year plan for replacing present braking systems on freight cars will develop a sizable demand for bolts, nuts and rivets. A limited demand is reported for tank

car construction. Discounts are uniformly firm.

## Bars

Until long awaited automotive buying appears, producers see no pronounced improvement for soft steel bar demand. While it is true that miscellaneous spot buying has increased noticeably, incoming tonnage falls far short of providing mills with backlogs. The same condition exists in the alloy bar market.

## Reinforcing Steel

Amended specifications for the Tygart Valley dam in West Virginia reveal a total requirement of 1700 tons, instead of 900 tons previously reported. It is not definite whether rail steel or billet steel reinforcing will be purchased for the project. Most other large-scale requirements are centered in Pacific Coast public works projects. Pennsylvania and West Virginia road work continues to bring in moderate tonnage to local producers. Paltry backlogs are the general rule, however, and there is little hope of substantial improvement from proposed public works releases against the most recent spending program until late in the winter.

## Cold-Finished Bars

The recent improvement in demand has not been sustained, and spot buying in the past week was generally apathetic. Motor car makers have not yet indicated when they will be ready to buy on a broad scale, but expectations still point to the end of October. Miscellaneous lines continue to purchase almost invariably on a hand-to-mouth basis.

## Plates and Shapes

A small quantity of plates will be required for construction on an order for 75 tank cars and 40 individual tanks awarded the Standard Tank Car Co. at Sharon, Pa. The United States Engineer Office at St. Louis has opened bids on 10 steel pontoons and 600 ft. of discharge pipe; Ingalls Iron Works is low bidder on the pontoons and pipe line trucks requiring 300 tons of plates, and Treadwell Construction Co., Midland, Pa., is low on 600 ft. of 24-in. discharge steel pipe. The plate market is otherwise quiet. New structural steel inquiries reaching this district in the past week were very limited. The American Bridge Co. will furnish 745 tons of floor beams and stringers for the Coos Bay bridge in Oregon for which 3400 tons of structural steel was awarded to Virginia Bridge & Iron Co.

## Wire Products

Spot orders for manufacturers' wire have increased, but merchant wire is relatively neglected. Despite the deleting of less carload quantity extras on

merchant items, some mills continue to adhere to the usual quantity differentials. Mill schedules are fluctuating sharply, with the weekly average not above 20 per cent.

#### **Tubular Products**

A further slight increase in demand for lap-weld tubing is noticeable. Home improvements under the Federal rehabilitation plan and seasonal repairs to domestic and industrial heating systems have accelerated the out-of-warehouse movement of standard pipe. Some replacements of stock have been necessitated, but mill schedules have not thus far benefited. While demand for oil country goods is fairly well sustained, the outlook for any definite improvement during the remainder of the year is somewhat vague. If the price of crude oil should be reduced, it is believed likely that drilling will face curtailment, and requirements of casing and drill pipe would naturally be reduced. With the exception of a few small gas lines entailing very small quantities, the line pipe market is lifeless.

#### **Sheets**

Demand shows no definite trend. Bookings in the past week were very general in character and were lacking in significant automotive tonnage. There is a slight improvement in galvanized demand for rural districts, while specifications from agricultural implement makers are likewise encouraging. Aggregate sheet volume, however, is barely supporting current operations of around 23 per cent.

#### **Tin Plate**

With all late vegetable crops out of the way, general specifications for tin plate are in a seasonal decline. The leading producer, however, is maintaining a fairly satisfactory rate of operations in rolling anticipatory tonnage. Independent mills, on the other hand, are depending largely on miscellaneous specifications, and have in many instances curtailed production. The average operating rate for the tin plate industry this week is estimated at 40 to 43 per cent.

#### **Strip Steel**

While October tonnage thus far is running well ahead of that for the same period last month, demand is not tending higher at the moment. In the past week spot buying was very well spread, with the lack of automotive tonnage accounting chiefly for the leveling off in bookings. At the present rate of daily bookings, strip mills are not able to maintain regular operations. Some mills are active only one or two days a week, with the average for the strip industry around 25 per cent.

#### **Coal and Coke**

The movement of furnace and foundry coke is still very sluggish. Slightly increased activity among foundries in this district, however, offers some hope for a pickup later in the month. The bituminous coal

market is particularly drab, although seasonal improvement in screened sizes is increasing. The resultant accumulations of slack present a difficult problem, with industrial demand at its present low ebb. Despite the price stability resulting from the bituminous coal code, competition has not shaken off the severity of precode trading since minimum price protection under the code has tempted many small drift and strip mine operators to operate previously uneconomic properties.

#### **Scrap**

A moderate tonnage of No. 1 heavy melting steel has been purchased by an independent mill at approximately \$10.85, delivered this district, with several dealers participating. Some brokers are harboring different ideas on prices, refusing to liquidate hold-

ings at present prices. Low-priced scrap is relatively scarce and resistance to further sharp concessions is growing. Very little scrap is being produced in this district and, with most railroad scrap moving directly into consumption, there are few exceptionally heavy dealer accumulations now hanging over the market. Another strengthening influence is that scrap along the Eastern seaboard, which normally might be directed inland, still finds a steady outlet for export shipment. On the weak side of the market is the continued absence of interest from large mills. Despite the low inventory position at some mills, the present low rate of mill operations foreshadows no immediate rush to buy scrap. An improved demand from steel foundries has strengthened the low phosphorus grades.

## **Resumption of Operations in Bessemer Plants Raises Steel Output in Valleys**

**Y**OUNGSTOWN, Oct. 16. — Raw steel production in the Valleys is tending higher as a result of increased consumer buying. Two leading independents have started operations at their Bessemer plants, and at least one-third of the district's Bessemer capacity will be engaged for a period of three weeks. Open-hearth furnaces are being added very slowly, with one additional unit scheduled to go on this week. Average operations for the district this week may reach 30 per cent, or possibly higher.

Although Valley steel executives are conservative in their forecasts of business for the remainder of the fourth quarter, they are particularly encouraged that improvement has appeared despite the absence of any heavy automotive buying. The impulse for the recent improvement has been very general in character, and the appearance of major tonnage from automobile centers by the end of October is expected to boost steel operations further.

Finishing mill schedules have not shown any particular lift in the past fortnight but are well sustained. Tin plate mills are paring output in line with seasonal influences in consuming markets. The outlook for tin plate for 1935 is considered even better than it was at the outset of the current year, since carryovers into next year will be considerably smaller than they were last January. There is some hesitancy on the part of consumers to place heavy anticipatory specifications against next year's orders, and tin plate mills are expecting a further drop from the present rate here of about 30 per cent for the next two months.

Sheet and strip production is depending almost entirely on miscellaneous spot orders. An early pick-up in

aggregate tonnage is considered certain by the close of October, when autobody makers and parts manufacturers will undoubtedly increase their takings measurably. Black and enameling sheets for stove making are moving regularly. The mail order house business in stoves is doing its share in stimulating demand for sheets. Sheets for radio manufacture are holding their own and are expected to be in greater demand when auto radio makers begin to speed operations.

Lapweld pipe production is fairly well sustained. Jobber demand for stationary pipe, largely sponsored by the HOLC, is increasing. Public works projects are likewise adding to activity in the pipe market. Few line projects are beyond the promotional stage.

Wire demand is fair from agricultural districts, while merchant items are not so active. Despite the omission of filed extras for less-carload quantities on merchant wire products, some producers are maintaining extras of 10c. a 100 lb. for the small shipments.

Soft steel bar tonnage is very general in character, with some seasonal assistance offered by agricultural implement makers. Reinforcing bar demand is favorable, chiefly owing to public works projects. Valley steel fabricators are generally engaged at 50 to 60 per cent of capacity.

A leading independent steel producer purchased approximately 30,000 tons of steel scrap in the past three weeks. Based on the purchase, No. 1 heavy melting steel at Youngstown is currently quotable at around \$10.50. Offers to sell very limited quantities of No. 1 steel at as low as \$10 are reported. Hydraulic bundles are available at \$10, delivered.

# Operations Off Two Points to 24 Per Cent at Chicago



**Sentiment Has Improved But Releases Have Fallen Off—New Rail Buying Program Is in the Offing—Scrap Unsteady**

**C**HICAGO, Oct. 16.—Chicago producers have been forced to lower ingot output by two points to 24 per cent of capacity as a result of a drop in specifications. Last week, which followed the course of many previous weeks, experienced a slight gain in releases before its close, but producers will not deviate from almost microscopic adjustment of output and therefore start this week in accordance with actual specifications at hand.

Notwithstanding some words of assurance from Government representatives that it is now recognized that real business gains must come largely through private channels, there is strong disposition for the average business man to ask for proof of the new attitude and as a consequence plans are being made at very short range.

New buying of finished steel is on a day-to-day basis and mills are operating practically without backlogs.

The flurry, if it may be called that, which existed for a few days in the local scrap market appears to have passed. Large consumers will not listen to suggestions of higher prices, and as a result bids for railroad scrap are dropping and brokers are pressing down on their sources of supplies.

While there is no clear-cut trend in the general business situation, there is a better mental tone prevailing. Whether or not this will carry forward enough to result in measurable gains in business remains to be seen.

## Pig Iron

Shipments of Northern foundry iron are making slow but steady headway. The farm implement manufacturers are still finding larger outlets and are here and there expanding operations. Most jobbing foundries are melting more iron, though their operations are still spotty and uncertain from one week to the next.

## Reinforcing Bars

Contractors who have taken Illinois road contracts are marking time, especially on slab work which will not be undertaken before next spring. The

400 tons of bars needed for the Ashland Avenue bridge, Chicago, have been placed and orders are reaching here from the Tennessee Valley project. There is a better tone to this market so far as private work is concerned, but all tonnages being contemplated are small. The Olson Rug Co., Chicago, which a month ago withdrew its plans, has again sent them out for figures.

## Cast Iron Pipe

This market remains active on the basis of PWA work. The general contract for the Michigan City, Ind., filter plant has been awarded to the Roberts Filter Co. Savanna, Ill., has ordered 200 tons, and McLean, Ill., has taken a like tonnage. Seymour, Wis., has closed for 400 tons. Prices for 6-in. and larger pipe remain steady at \$39, Birmingham, or \$47 a ton, delivered Chicago.

## Rails

It now develops that a number of railroads are making intensive studies of their needs in rails, though mid-November appears to be the earliest time that actual inquiries can reach the market. The greatest activity seems to be by those railroads that usually are in position to make purchases from funds at hand, though it is known to steel makers that the movement is broader than that. No official word has reached here that the Government will again lend money for rail purchases, though such action can be implied from recent events. In the meantime Chicago rail mills are down, with no immediate prospect of resuming operations. Track accessories are in slightly better demand and orders for light rails are the best of the year.

## Wire Products

Sellers of wire and wire products are convinced that the tone of business is better but so far cannot measure the change for the better in terms of bookings. In fact, the week just closed and the new one starting have all the general characteristics shown by any other like period for the past several months. Automobile manufacturers are nibbling in the market but are buying relatively little in the

aggregate. Jobbers have been moving a considerable portion of their stocks, but are allowing them to shrink by ordering only small fill-in lots.

## Sheets

Automobile manufacturers are entering the market in a small way for tonnages that are to be shipped at once. Demand from other sources remains light and scattered and hot mill output has not risen above 30 per cent of capacity. Container and barrel makers, usually large outlets for sheet mill products, are operating on light schedules.

## Plates

Michigan City, Ind., has ordered tanks requiring 400 tons of plates. This is the only award of size in this territory, which for months has been lagging behind most other sections of the country as a source of plate tonnage. The last of the steel for the Illinois Central car repair program has been shipped and as a consequence the bulk of plates now moving is for fabricated structural projects.

## Structural Material

Awards and inquiries virtually balance one another, at about 4500 tons each. Most significant in this week's business are awards totaling close to 1200 tons for two foundry additions. One of these will be built by the Griffin Wheel Co. at Chicago and the other is an addition to the American Steel Foundries plant at Granite City, Ill. Almost half of fresh inquiries is represented by bridges that will be built by the State highway department of Oklahoma.

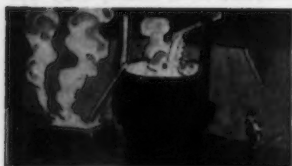
## Bars

New buying remains on a day-to-day basis and is not so brisk as a week ago. In fact, both orders and specifications are a shade under the rate that has been holding for several weeks. The farm implement group is easily the brightest spot in this market. Production schedules are at a fair level and the trade is optimistic as to the outlook for next year. Some farm implement builders expect 1935 sales to at least double the volume of 1934.

## Scrap

Heavy consumers are standing by and brokers' trades are becoming less frequent. Users will not consider heavy melting steel above \$9, but dealers are bidding \$9.25 a gross ton delivered for railroad steel and broker trades are bringing out prices above \$9 a ton. Indication of a drift is given by recent purchases of railroad heavy melting steel which went at 30c. a ton under previous purchases. There is a possibility that about 4000 tons of No. 2 busheling may move from a Chicago dock for Lake Erie before the close of navigation. Very little foreign inquiry is pending in this market.

# Philadelphia District Steel Operations Are Slowly Rising



**Finished Steel Orders in First Half of Month Running Slightly Ahead of Corresponding September Period — Navy Releases More Substantial**

**P**HILADELPHIA, Oct. 16—Finished steel orders have been somewhat heavier in the last week, although business is still confined to small lots. Indications that consumer stocks are now being exhausted are more numerous and mills report the first orders from Pacific Coast jobbers since June. Release by the Navy Department of galvanized material placed last summer will improve rolling schedules over the remainder of the month in both plate and sheet mills.

Steel ingot production in the Philadelphia district is one point higher this week, being estimated at 22 per cent of capacity. One open-hearth plant, which has been idle for two or three weeks has resumed production on a limited scale and plants which had been stocking steel are now rolling the majority of their current make. Finishing mill schedules are also improved, particularly in the case of units rolling structural shapes and plates.

Sentiment among steel makers is somewhat better as the result of advices from Washington that no immediate changes in the iron and steel code are in prospect. The effect upon buyers who had been looking for lower steel prices is expected to be beneficial, particularly in the case of large users. The only unfavorable price development has taken place in the bolt and nut market where increasingly large discounts are being offered. Bolts are now freely available at 70 and three tens off list with a flat 80 per cent discount being offered in some instances. The bolt and nut industry has never been codified.

The structural steel market is somewhat more active. Bids have been taken on the last section of the high-speed approach to the Delaware River bridge, requiring about 900 tons of structural steel. Completion of the job will also require about 500 tons of rails, a quantity of guard rails and miscellaneous accessories. Bids will be taken Oct. 31 on an administrative, engineering and testing building at the Philadelphia Navy Yard, requiring 900 tons of shapes.

## **Pig Iron**

This market is enlivened only by a few carlot demands. Nevertheless the

general sentiment of melters is somewhat more encouraging, and better business is anticipated by furnace representatives before the end of the quarter. This improvement, however, depends on probable increases in mill and foundry melts as buyers perceive no inducement to stock iron. Recent offers of various grades of Russian iron have been ignored in most directions, and no actual orders are known to have been placed despite rumors of liberal price concessions. The only open inquiry of current interest is for 150 tons of low-phos iron for the Washington Navy Yard.

## **Bars, Plates and Shapes**

The market is somewhat more active as the result of improved structural steel demand and increased releases by the Navy Department of plates for galvanizing. The latter tonnage was placed last summer, but several hundred tons has now reached mills, improving rolling schedules and increasing activity in galvanizing plants. The largest job before the fabricating trade is the last section of the high-speed approach to the Philadelphia-Camden bridge on which bids are in. A building at the Philadelphia Navy Yard will also take 900 tons of fabricated structural steel and probably a considerable tonnage of reinforcing bars. The bar market is otherwise rather quiet, with orders coming almost entirely from highway projects.

## **Sheets**

Business is showing a steady improvement, although gains in tonnage are scarcely perceptible from week to week. Automobile stamping plants in the district have not yet begun to place substantial orders, but business from this source is expected to improve before the end of the month. Radio makers are taking small quantities of strip steel, and stove makers continue fairly busy. Jobber demand is limited to the immediate needs of warehouses, although improved orders are beginning to come in from the Pacific Coast.

## **Scrap**

Furnace operations here have improved slightly, but purchasing agents are still apparently uninterested in

new scrap commitments. Brokers have sold several small tonnages of iron and steel in eastern Pennsylvania, but the only semblance of real business comes from export activity. Europe and the Orient have placed additional orders. Also loadings of steel are being made daily at Port Richmond at average prices unchanged from a week earlier, namely, \$9.25 for No. 1 steel. An unusual current inquiry is that of the Philadelphia Navy Yard for 2500 lb. of horseshoe nail trimmings.

## **Imports**

The following iron and steel imports were received here last week: 685 tons of pig iron from British India, 176 tons of iron ore from Germany and 4 tons of steel bars from Sweden.

## **Southern Output Unchanged**

**B**IRMINGHAM, Oct. 16.—There has not been much change in the drab tone of the pig iron and steel markets. Most of the current pig iron buying is on a spot basis and the few contracts placed are for limited amounts for early consumption. Foundries struggled through the summer with heavy stocks and they are not inclined to build them up again, with business irregular and the price stationary. The base quotation for both spot and contract business is \$14.50. Furnace operations are unchanged, with five stacks in blast.

Steel demand is rather slack, with sheets and wire products furnishing the only activity. Heavier buying of sheets and wire products is still being looked forward to from the country trade, but has been disappointing to date. It is believed there will be a material improvement by the end of the month. Buying of bars, plates and shapes is at a low point.

Six open-hearths were in operation last week and the same number will be worked during the current week. No change has been made in this schedule for several weeks.

Last week Ingalls Iron Works delivered 50 steel barges to the United States Engineers at Paducah, Ky. The barges were built in Decatur, Ala., at the plant of the American Oak Leather Co.

## **Scrap Prices Unaltered At Detroit**

**D**ETROIT, Oct. 16.—Although there has been virtually no fresh scrap buying in the past week, a steel company at Cleveland is reported to have given releases for shipment of old material by water from Detroit. With the automobile industry operating at a low rate, little scrap is coming on to the market. Prices are unchanged.

# Further Rise in Steel Output In Cleveland-Lorain District



**Ingot Rate Up Two Points to 26 Per Cent  
of Capacity — Demand for Sheets for  
Stamping Plants Due to Expand**

**C**LEVELAND, Oct. 16.—While the recent slight improvement in the demand for finished steel is being maintained, no further gain is reported. Orders for substantial tonnages from the automotive industry that are counted on to help the steel industry have not yet materialized, although some business came from this source during the week for parts for new models. Automobile manufacturers also have sent out a fresh batch of inquiries for stampings for new models, and this business, which probably will be placed shortly, will stimulate the demand for sheets and strip steel and help some of the stamping plants which have not very much work at present. Some new inquiries are also out for automobile forgings.

The volume of business in the heavier rolled steel products so far this month is only slightly ahead of the corresponding period of September. Sheets and strip steel have made a somewhat better gain.

Ingot output in the Cleveland-Lorain territory gained two points this week through the starting up of an additional open-hearth furnace in Lorain and is now at 26 per cent of capacity, or the highest since July.

Aside from the still rather limited demand for steel from motor car manufacturers, orders are confined to small miscellaneous lots. Some of the steam shovel manufacturers are getting busier owing to recently placed orders for equipment for Government projects. Few other metal-working industries show an upward trend. Business from the railroads is almost negligible. The Erie Railroad, it is stated, will undertake no further bridge construction work this year. Considerable repair work in the Lake shipyards is in prospect for the early winter.

## Pig Iron

Demand continues to creep upward as stocks of many producers are used up. Shipments by a leading Lake furnace interest were 125 per cent larger and sales 100 per cent greater during the first half of October than during the corresponding period of September. With no incentive to cover for extended requirements, foundries are buying only for early needs and most

orders are for small lots. Demand from some of the foundries making automobile castings has increased. Foundries making radiators and furnaces are quite busy. Conditions in jobbing foundries remain rather quiet.

## Sheets

New demand continues rather light. While some business is coming from the motor car industry the orders evidently are still for fill-in purposes and do not involve large tonnages. The Chevrolet Motor Co. has sent to stamping plants in this territory inquiries for various stampings for its new models. At present these plants do not have much automotive work. Stove manufacturers continue to take fair-sized lots.

## Strip Steel

Demand from the automotive industry gained last week through the placing of some good orders for both hot and cold-rolled steel by General Motors accessory plants. This steel was ordered for November production, probably mostly on new models. With this exception little new business came from the automotive industry. Orders from other sources are light.

## Iron Ore

Shipments for the season are being cleaned up rapidly and little ore will be moved in November. Receipts at Lake Erie ports during September were 2,343,438 tons as compared with 4,205,493 tons during the same month last year. Shipments from these ports last month were 1,414,050 tons as against 3,026,193 tons during the same month a year ago. Receipts at other than Lake Erie ports during September were 1,024,628 tons and in the same month last year 1,200,230 tons. Dock balance Oct. 1 was 5,200,825 tons as against 5,033,573 tons on Oct. 1 a year ago.

## Bolts, Nuts and Rivets

Demand shows a moderate gain over September. Business is coming from diversified industries and jobbers, but not a great deal from the automotive industry. Agricultural implement makers from whom very little business has come for a long time are now making some purchases. The re-

cent price reduction did not entirely eliminate price shading, as an additional 5 to 10 to the discount has been made in some cases to large jobbers.

## Bars, Plates and Shapes

Activity in steel bars continues light. However, the outlook is improved by prospective business in automobile forgings. Plans for the Lorain Avenue bridge, Cleveland, requiring 2000 tons or more of structural shapes are expected to be issued by the State highway department before the end of the month. The State has asked for bids for five bridges, taking 260 tons, and other lists of construction work are looked for from this source shortly. The Owens Bottle Co., Toledo, will remodel a building requiring 300 tons of shapes. The Standard Oil Co. of Ohio will erect several tanks in Cleveland requiring 350 tons. There is a limited demand for plates for boilers but virtually none for tanks.

## Scrap

Mills in the Youngstown district are taking shipments with quantities regulated, and dealers are buying some Cleveland scrap for delivery to those consumers at \$10 to \$10.25 for No. 1 heavy melting steel, \$9.25 for No. 2 and \$9.50 for hydraulic bundles. There is no local demand for either steel making or blast furnace grades. Quotations are unchanged.

## Signs of Strength in Boston Scrap Market

**B**OSTON, Oct. 16.—Local brokers generally have advanced bundled skeleton 50c. a ton, to \$4, f.o.b., for Pittsburgh delivery, but as there is not much material to be had, no real activity has developed. There is still a good demand for No. 1 steel for export at around \$7.50 a ton, delivered alongside Boston, and for No. 2 steel at about \$6.50 a ton. A steamer is loading 4000 tons here, and another boat is scheduled to take a part cargo late this month, following which it will load 2500 tons at Providence, R. I. Some No. 1 and No. 2 steel is reported to have been shipped here from Worcester, Mass., for export at a price better than that offered by the American Steel & Wire Co.

No improvement in pig iron buying is noted, and the outlook is not considered encouraging. Some recent buying has been in truck loads, an indication of the limited weekly melt.

With the closing of bids today on 8000 tons for a local parcel post building, there is little additional structural steel business in prospect for the remainder of 1934. Lettings of reinforcing steel bars are in lots of less than 100 tons, and were few and far between.

# Richberg Announcement Steadies New York Market



**Bookings Show Little Further Gain—  
Restocking May Be Halted With  
Approach of Year-End Inventory Period**

**N**EW YORK, Oct. 16.—Finished steel business has shown little, if any, further improvement. The market, however, has been steadied by the unequivocal announcement of Donald Richberg that no changes in the price regulations of the steel code will be asked for by the Administration. Such assurance was necessary at this time not only to protect the price structure from progressive demoralization but also to support wage rates. Wage reductions would have been a certain sequel of price declines. And wage cuts may yet prove inevitable unless business volume rebounds. At present operating levels, steel producers are suffering large losses.

Current steel orders are mainly for the purpose of filling in holes in consumers' stocks. Speculative tonnage accumulated in the second quarter has been largely worked off and buyers are now replenishing their inventories as needs arise. Purchases for restocking purposes, however, are likely to become more and more conservative as the year-end inventory taking period draws near.

Tin plate specifications are falling off both from domestic and foreign sources. External buyers bought heavily in anticipation of successive advances in international prices. American export prices, which recently approximated \$4.33 per base box, Pittsburgh, has risen again, this time to about \$4.40. Japan continues to be an active buyer of tin plate waste wasters.

The Pennsylvania is on the verge of buying 60 electric locomotives. In general, however, the railroads have tightened up on their purchases. The New York Central is revising its plans for its section of the West Side highway, Manhattan.

Bids will go in on the Boston post office, requiring 7000 tons of structural steel, Oct. 16. The steel for the reconstruction of Argentine refineries of the Standard Oil Co. of New Jersey, totaling about 12,000 tons, has been placed with German mills. This was done to enable the company to get blocked marks out of Germany.

## Pig Iron

The average small foundry in this territory has only a small yard stock whereas the larger consumers are still fairly well supplied with iron. Therefore, selling is mostly of a fill-in nature, although a few current orders ask for delivery over the balance of the year. Total bookings last week amounted to 1850 tons, as compared with 1200 tons in the preceding period and 1400 tons sold two weeks earlier. In general average weekly iron sales are holding at a higher level than was the case a month ago. Because of this it would appear that general foundry activity is somewhat better. It is reported that a Buffalo furnace as well as the Troy stack have been banked. The Troy concern is now shipping iron down the Hudson to Jersey City for rail delivery to eastern Pennsylvania and central New Jersey. Several furnace men in this district estimate that over 15,000 tons of Troy iron has been delivered recently in this manner.

## Reinforcing Steel

Distributors here continue to be moderately active, although larger tonnages are not so plentiful as in past weeks. The American Steel & Wire Co. has been awarded about 475 tons of mesh for highway work in Rhode Island and Connecticut. Pending projects consist of 600 tons of bars and mesh for highway work in Morris County, N. J., and 300 tons for construction in Dutchess County, N. Y. In addition about 500 tons for miscellaneous highway work will be let in Albany, N. Y., next week.

## Scrap

The Harrisburg, Pa., consumer has released several shipments of heavy breakable cast but otherwise the domestic market continues inactive. The export market is still booming, however, and over 1,000,000 tons of scrap has been shipped out during the first eight months of 1934. Japan has been the principal taker, and most of the shipments have been from the Atlantic seaboard. Foreign buyers are even more anxious than usual for

additional scrap commitments. Only unfavorable ship rates and increasing difficulty in securing certain grades here are keeping export buying from getting heavier. Contrary to the usual belief, much of the scrap is going into rolled products not related to armaments. At present in the New York area two boats are loading and another is expected to dock within the week. One boat is loading steel and stove plate for England and the other is loading mostly heavy machinery cast for Italy. Broker purchases against the former order have resulted in a price rise to \$5.50 to \$6 a ton on barge for stove plate. Likewise rerolling rails have advanced to \$8.75, and well over \$4 a ton has been paid for desirable lots of unprepared yard iron and steel.

## Canada Importing British Piling

**T**ORONTO, ONT., Oct. 16.—General business in the Canadian iron and steel markets is moving along in a more or less featureless manner. While new orders are limited, both in number and tonnage, it is expected there will be minor revival before the close of the year. The Imperial Bank will erect an office building at King and Ray Streets, Toronto, for which approximately 800 tons of steel will be required, according to present plans.

Steel piling from Britain has arrived in Canada recently, and other shipments are said to be on the way. The first cargo was 800 tons and a similar shipment is to be made shortly. The steel is for use in the Dominion Government's building program, and will be delivered to various centers in Quebec and Ontario.

Demand for merchant pig iron has been holding a fairly even keel, but owing to the Thanksgiving holiday sales dropped somewhat during the past week when total awards were around 350 tons. Melt is holding around 35 per cent.

Trading in iron and steel scrap is dull and featureless. Demand is confined to special grades, mostly from foundry interests. Prices are unchanged.

Fifty-one foundrymen from England, Germany, France, Czechoslovakia, Spain and Italy were guests of the Detroit Foundrymen's Association on Oct. 16 and 17, visiting plants in Detroit, Flint, Vassar and Saginaw, Mich. The association gave a dinner in their honor at the Detroit Golf Club on Oct. 16. The foundrymen were en route to the Fifth International Foundry Congress at Philadelphia.

# Fabricated Structural Steel

## Awards Decline—New Projects in Fair Volume

**S**TRUCTURAL steel lettings at 8580 tons compare with 15,700 tons in the previous week and 15,850 tons two weeks ago. The largest lettings are 3400 tons for a bridge at Coos Bay, Ore., and 890 tons for an addition to the Griffin Wheel Co. plant, Chicago. New projects of 14,302 tons rose sharply from the 6400 tons reported last week and compare with 12,300 tons two weeks ago. Among fresh inquiries are 5000 tons for the Lorain Avenue bridge in Cleveland, and 2300 tons for bridges in Oklahoma. Plate awards total 2200 tons, with inquiries up to 2440 tons. Structural steel lettings for the week follow:

### NORTH ATLANTIC STATES

Springfield, Mass., 405 tons, Federal Land Bank building, to Shippers Car Line Corp.

Orange County, N. Y., 120 tons, highway bridge, to American Bridge Co.

Chester, Pa., 205 tons, Scott Paper Co. building, to Belmont Iron Works.

Scranton, Pa., 395 tons, State highway bridge, to McClintic-Marshall Corp.

### THE SOUTH

Wilmington, N. C., 1600 tons, steel piling for lock and dam No. 2, Cape Fear River, United States Engineer Office, to Carnegie Steel Co.

Macon, Miss., 200 tons, bridge, to Ingalls Iron Works Co., Birmingham.

Flomaton, Ala., 155 tons, highway bridge, to Nashville Bridge Co.

### CENTRAL STATES

Cincinnati, 180 tons, Cincinnati Chemical Works building, to L. B. Schreiber & Sons Co.

Cincinnati, 125 tons, building for Remington-Rand Co., to Austin Co.

Chicago, 890 tons, addition to Griffin Wheel Co., to Mississippi Valley Structural Steel Co., local.

Granite City, Ill., 370 tons, addition to plant of American Steel Foundries, Inc., to unnamed fabricator.

Henderson County, Ill., 200 tons, overhead, to Superior Structural Steel Co.

Jeffersonville, Ind., 170 tons, Colgate Co. building, to Bedford Foundry & Machine Co.

Detroit, 165 tons, building for Bower Roller Bearing Co., to Palmer Bee Co.

Trempealeau, Wis., 1500 tons, piling, to Illinois Steel Co., previously reported as 2600 tons to American Bridge Co.

Ashland, Neb., 350 tons, building, to Hansell-Elcock Foundry Co., Chicago.

State of Nebraska, 450 tons, highway bridge, to McClintic-Marshall Corp.

Sioux Falls, S. D., 320 tons, high school building, to Pittsburgh-Des Moines Steel Co.

### WESTERN STATES

Arcadia, Cal., 550 tons, race track addition, to Consolidated Steel Corp.

Los Angeles County, Cal., 300 tons, Dark Canyon bridge, to Consolidated Steel Corp.

Coos Bay, Ore., 3400 tons, Coos Bay bridge, to Virginia Bridge & Iron Co.; 745 tons floor beams and stringers to be furnished by American Bridge Co.

### STRUCTURAL INQUIRIES

#### NORTH ATLANTIC STATES

Boston, 400 tons, Mystic River bridge.

New York, 800 tons, bus terminal and theater.

Lake Placid, N. Y., 350 tons, bridge for New York Department of Public Works.

Smithtown, N. Y., 120 tons, bridge for New York Department of Public Works.

Windsor, N. Y., 180 tons, grade elimination for Delaware & Hudson Railroad.

Union County, N. J., 140 tons, overpass for Lehigh Valley Railroad.

South Plainfield, N. J., 300 tons, bridge for Lehigh Valley Railroad.

Philadelphia, 900 tons, administrative, engineering and testing building for Philadelphia Navy Yard.

### CENTRAL STATES

State of Ohio, 260 tons, five bridges. Bids Oct. 19 and 20.

Cleveland, 100 tons, piling for Standard Oil Co. of Ohio.

Cleveland, 5000 tons, Lorain Avenue bridge; bids to be taken by State highway department late this month or early in November.

State of Ohio, 260 tons, highway bridges.

Youngstown, 160 tons, building alteration for Isaly Dairy Co.

Ashtabula Harbor, Ohio, 100 tons, sheet steel piling for boat slip. John Drandrea, Lorain, Ohio, low bidder.

State of Wisconsin, 475 tons, highway bridges.

Waterloo, Iowa, 300 tons, storage building for John Deere Tractor Co.

State of Nebraska, 715 tons, highway bridges.

### SOUTH AND SOUTHWEST

Leitchfield, Ky., 100 tons, building.

State of Oklahoma, 2300 tons, bridges.

### WESTERN STATES

El Portal, Cal., 200 tons, building.

San Jose, Cal., 350 tons, building.

Mora County, N. M., 362 tons, two State bridges on U. S. Highway No. 85, bids under advisement.

Kern County, Cal., 100 tons, State undercrossing, bids Oct. 31.

Los Angeles, 100 tons, structural hinges for city subway, plans completed.

Seattle, Wash., 170 tons, powerhouse, railroad bridge and switch platform, bids taken.

Grays Harbor County, Wash., 260 tons, State bridge and approaches over Wynooche River, bids under advisement.

### FABRICATED PLATE

#### AWARDS

Leetsdale, Pa., 160 tons, derrick boat hull, to American Bridge Co.

Peoria, Ill., 110 tons, gas holder, to Graver Tank & Mfg. Co.

Corpus Christi, Tex., 1030 tons, tanks, to Wyatt Metal & Boiler Works.

Michigan City, Ind., 400 tons, tanks, to Chicago Bridge & Iron Works.

Fort Peck, Mont., 500 tons, tunnel liners, to Pittsburgh district fabricator.

#### NEW PROJECTS

Lowell, Mass., 300 tons, three standpipes. McClintic-Marshall Corp. is low bidder, but no award has been made as yet.

Cleveland, 350 tons, tanks and tower supports for Standard Oil Co. of Ohio.

Cape May, N. J., 200 tons, tanks.

St. Louis, 180 tons, 10 full-deck steel pontoons, for United States Engineer Office; Ingalls Iron Works, Birmingham, Ala., apparent low bidder at \$25,510.

Mesa, Ariz., 160 tons, pipeline extension for Western Gas Co., bids Oct. 25.

Phoenix, Ariz., 100 tons, two boilers for State, bids under advisement.

Bremerton, Wash., 1088 tons plates and sheets, material for Puget Sound Navy Yard, bids taken.

Mare Island, Cal., 544 tons plates and sheets, material for Navy Yard, bids taken.

## Reinforcing Steel

### Awards 1360 Tons—New Projects 4100 Tons

Pike County, Pa., 135 tons, highway work, to Kalman Steel Corp.

Decatur, Ill., 105 tons, post office, to Concrete Engineering Co.

Tennessee Valley Project, 250 tons, to Joseph T. Ryerson & Son.

Seattle, Wash., 400 tons, Skagit River project, to Northwest Steel Rolling Mills Co.

Pullman, Wash., 100 tons, powerhouse at State University, to Soule Steel Co.

Providence, R. I., 275 tons, mesh for highway, to American Steel & Wire Co.

State of Connecticut, 200 tons, two highway projects, to American Steel & Wire Co.

### NEW REINFORCING BAR PROJECTS

Dutchess County, N. Y., 300 tons, mesh and bars for highway construction.

Albany, N. Y., 500 tons, lettings next week for miscellaneous highway projects.

Morris County, N. J., 600 tons, bars and mesh; George M. Brewster Co., general contractor.

State of Illinois, 500 tons, road work. Bids opened.

San Francisco, 132 tons, Woodlawn mausoleum, H. H. Lawson low on general contract.

State of California, 130 tons, highway work in five counties, bids Oct. 25.

Mora County, N. M., 106 tons, two State bridges on U. S. Highway No. 85, bids taken.

Pasadena, Cal., 200 tons, repairs on Madison and Lincoln schools, general contracts awarded.

Santa Barbara County, Cal., 111 tons, State paving and highway structure, bids Oct. 31.

Los Angeles, 1275 tons, city subway between Avila and Date Streets, plans completed.

Seattle, Wash., 150 tons additional, powerhouse, railroad bridge and switch platforms, bids under advisement.

Washington County, Idaho, 103 tons, State bridge over Weiser River, bids Oct. 26.

## Foundry Equipment Orders Increased

**N**ET orders for foundry equipment gained during September. The index number was 46.4, compared with 43.1 in August, according to the monthly report of the Foundry Equipment Manufacturers Association based on returns from 21 members. Unfilled orders in September increased, the index number now being 46.6, compared with 36.3 in August.

# Prices of Finished Steel and Iron Products

## BARS, PLATES, SHAPES

Iron and Steel Bars	
Soft Steel	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
F.o.b. Duluth	1.95c.
Del'd Detroit	1.95c.
F.o.b. Cleveland	1.85c.
F.o.b. Buffalo	1.90c.
Del'd Philadelphia	2.00c.
Del'd New York	2.13c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. cars dock Pacific ports	2.35c.

Rail Steel	
(For merchant trade)	
F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Gary	1.75c.
F.o.b. Moline, Ill.	1.75c.
F.o.b. Cleveland	1.75c.
F.o.b. Buffalo	1.80c.
F.o.b. Birmingham	1.85c.
F.o.b. cars dock Gulf ports	2.10c.
F.o.b. cars dock Pacific ports	2.25c.

Billet Steel Reinforcing	
(Straight lengths as quoted by distributors)	
F.o.b. Pittsburgh	2.05c.
F.o.b. Chicago	2.10c.
F.o.b. Gary	2.10c.
Del'd Detroit	2.20c.
F.o.b. Cleveland	2.10c.
F.o.b. Youngstown	2.10c.
F.o.b. Buffalo	2.10c.
F.o.b. Birmingham	2.10c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.45c.

Rail Steel Reinforcing	
(Straight lengths as quoted by distributors)	
F.o.b. Pittsburgh	1.95c.
F.o.b. Chicago	1.95c.
F.o.b. Gary	1.95c.
F.o.b. Cleveland	1.95c.
F.o.b. Youngstown	1.95c.
F.o.b. Buffalo	1.95c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. cars dock Pacific ports	2.30c.

Iron	
F.o.b. Chicago	1.80c.
F.o.b. Terre Haute, Ind.	1.75c.
F.o.b. Louisville, Ky.	2.10c.
F.o.b. Danville, Pa.	1.80c.
F.o.b. Berwick, Pa.	1.80c.

## Cold Finished Bars and Shafting\*

Base per Lb.	
F.o.b. Pittsburgh	2.10c.
F.o.b. Chicago	2.15c.
F.o.b. Gary	2.15c.
F.o.b. Cleveland	2.15c.
F.o.b. Buffalo	2.20c.
Del'd Detroit	2.30c.
Del'd eastern Michigan	2.35c.

\* In quantities of 10,000 to 10,000 lb.

## Fence and Sign Posts

Angle Line Posts	Base per Net Ton
F.o.b. Pittsburgh	55.00
F.o.b. Chicago	50.00
F.o.b. Duluth	51.00
F.o.b. Cleveland	50.00
F.o.b. Birmingham	53.00
F.o.b. Houston	39.00
F.o.b. cars dock Pacific ports	65.00

## Plates

Base per Lb.	
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
Del'd Cleveland	1.95c.
F.o.b. Coatesville	1.90c.
F.o.b. Sparrows Point	1.90c.
Del'd Philadelphia	1.95c.
Del'd New York	2.08c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. cars dock Pacific ports	2.35c.
Wrought iron plates, f.o.b. P'gh.	3.00c.

## Floor Plates

F.o.b. Pittsburgh	3.35c.
F.o.b. Chicago	3.40c.
F.o.b. Coatesville	3.45c.
F.o.b. cars dock Gulf ports	3.75c.
F.o.b. cars dock Pacific ports	3.90c.

## Structural Shapes

Base per Lb.	
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
Del'd Cleveland	1.95c.
F.o.b. Buffalo	1.90c.
F.o.b. Bethlehem	1.90c.
Del'd Philadelphia	2.05c.
Del'd New York	2.05c.
F.o.b. Birmingham (standard)	1.95c.
F.o.b. cars dock Gulf ports	2.25c.
F.o.b. cars dock Pacific ports	2.35c.

## Steel Sheet Piling

Base per Lb.	
F.o.b. Pittsburgh	2.15c.
F.o.b. Chicago	2.25c.
F.o.b. Buffalo	2.25c.
F.o.b. cars dock Gulf ports	2.60c.
F.o.b. cars dock Pacific ports	2.60c.

## SHEETS, STRIP, TIN PLATE

### TERNE PLATE

Hot Rolled	Base per Lb.
No. 10, f.o.b. Pittsburgh	1.85c.
No. 10, f.o.b. Gary	1.95c.
No. 10, del'd Detroit	2.05c.
No. 10, del'd Phila.	2.14c.
No. 10, f.o.b. Birmingham	2.00c.
No. 10, f.o.b. dock cars Pacific ports	2.40c.

### Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	2.40c.
No. 24, f.o.b. Gary	2.50c.
No. 24, del'd Detroit	2.60c.
No. 24, del'd Phila.	2.69c.
No. 24, f.o.b. Birmingham	2.55c.
No. 24, f.o.b. dock cars Pacific ports	3.05c.
No. 24, wrought iron, Pittsburgh	4.30c.

### Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	2.50c.
No. 10 gage, f.o.b. Gary	2.60c.
No. 10 gage, del'd Detroit	2.70c.
No. 10 gage, del'd Phila.	2.79c.
No. 10 gage, f.o.b. Birmingham	2.55c.
No. 10 gage, f.o.b. dock cars Pacific ports	3.10c.

### Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	2.95c.
No. 20 gage, f.o.b. Gary	3.05c.
No. 20 gage, del'd Detroit	3.15c.
No. 20 gage, del'd Phila.	3.24c.
No. 20 gage, f.o.b. Birmingham	3.10c.
No. 20 gage, f.o.b. dock cars Pacific ports	3.50c.

### Galvanized Sheets

No. 24, f.o.b. Pittsburgh	3.10c.
No. 24, f.o.b. Gary	3.20c.
No. 24, del'd Phila.	3.39c.
No. 24, f.o.b. Birmingham	3.25c.
No. 24, f.o.b. dock cars Pacific ports	3.70c.
No. 24, wrought iron, Pittsburgh	4.95c.

### Long Ternes

No. 24, unassorted 8-lb. coating	3.40c.
F.o.b. cars dock Pacific ports	4.10c.

### Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	3.10c.
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### Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.75c.
No. 28, Gary	2.85c.
No. 28, cars dock, Pacific Coast	3.35c.

### Tin Plate

Base per Box	
Standard cokes, f.o.b. P'gh district mill	55.25
Standard cokes, f.o.b. Gary	53.35
Standard cokes, f.o.b. cars dock Pacific ports	5.90

### Terne Plate

(F.o.b. Pittsburgh)	
(Per Package, 20 x 28 in.)	
8-lb. coating I.C.	\$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

### Hot-Rolled Hoops, Bands, Strips and Flats under 1/4 in.

Base per Lb.	
All widths up to 24 in., P'gh.	1.85c.
All widths up to 24 in., Chicago	1.95c.
All widths up to 24 in., del'd Detroit	2.05c.
All widths up to 24 in., Birmingham	2.00c.
Cooperage stock, Pittsburgh	2.10c.
Cooperage stock, Chicago	2.20c.

### Cold-Rolled Strips

Base per Lb.	
F.o.b. Pittsburgh	2.60c.
F.o.b. Cleveland	2.60c.
Del'd Chicago	2.85c.
F.o.b. Worcester	2.80c.

### Fender Stock

No. 14, Pittsburgh or Cleveland	2.90c.
No. 14, Worcester	3.30c.
No. 20, Pittsburgh or Cleveland	3.30c.
No. 20, Worcester	3.70c.

### Hot-Rolled Rail Steel Strips

Base per Lb.	
F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Birmingham	1.85c.

## WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

### To Manufacturing Trade Per Lb.

Bright wire	2.30c.
Spring wire	3.20c.
Chicago prices on products sold to the manufacturing trade are \$1 a ton above Pittsburgh or Cleveland.	

### To Jobbing Trade

Qualified jobbers are entitled to a reduction of 20c. a 100 lb. from the base price on carload shipments to stock, and of 10c. a 100 lb. on less-carload shipments to stock.

### Base per Keg

Standard wire nails	\$2.60
Smooth coated nails	2.60
Galvanized nails	3.55
15 gage and coarser	4.60
16 gage and finer	5.10

### Base per 100 Lb.

Annealed fence wire	\$2.45
Galvanized fence wire	2.80
Galvanized staples	3.30
Galvanized staples	3.55
Barbed wire, galvanized	3.00
Woven wire fence, base column	63.00

Chicago and Anderson, Ind., mill prices are \$1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is \$2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are \$2 a ton over Pittsburgh (except for woven wire fence at Duluth which is \$3 over Pittsburgh), and Birmingham mill prices are \$3 a ton over Pittsburgh.

On manufacturers' wire prices at Pacific ports are \$9 above the Pittsburgh base. On high-carbon spring wire, prices at Pacific ports are also \$9 above Pittsburgh. On wire nails, barbed wire, staples and fence wire, prices at Houston, Galveston and Corpus Christi are \$6 a ton over Pittsburgh, while New Orleans and Pacific Coast prices are \$8 over Pittsburgh. Exception: on fence wire Pacific Coast prices are \$11 a ton above Pittsburgh.

## Wire Hoops, Twisted or Welded

F.o.b. Pittsburgh	35 and 2 1/2 off
F.o.b. Chicago	35 off

## Bale Ties, Single Loop

Base per Net Ton	
F.o.b. Pittsburgh	\$63.00
F.o.b. Chicago	64.00
F.o.b. Duluth	65.00
F.o.b. Cleveland	63.00
F.o.b. Birmingham	66.00
F.o.b. cars dock Houston, Galveston, Beaumont, Orange or Corpus Christi, Tex.	72.00
F.o.b. cars dock Pacific ports	74.00

## STEEL AND WROUGHT PIPE AND TUBING

### Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

### Butt Weld

Steel			Wrought Iron		
Inches	Black	Galv.	Inches	Black	Galv.
1/2	51 1/2	29 1/2	1/2	+ 91 1/4	+ 138
3/4	53 1/2	35	3/4	+ 93 1/4	+ 141
1	55 1/2	47	1	+ 95 1/4	+ 15
1 1/4	57 1/2	52	1 1/4	+ 97 1/4	+ 20 1/2
1 1/2	59 1/2	55	1 1/2	+ 99 1/4	+ 25 1/2
1 3/4	61 1/2	58	1 3/4	+ 101 1/4	+ 28
2	63 1/2	63	2	+ 103 1/4	+ 31 1/2
2 1/2	65 1/2	68	2 1/2	+ 105 1/4	+ 34 1/2
3	67 1/2	73	3	+ 107 1/4	+ 37 1/2
3 1/2	69 1/2	78	3 1/2	+ 109 1/4	+ 40 1/2
4	71 1/2	83	4	+ 111 1/4	+ 43 1/2
4 1/2	73 1/2	88	4 1/2	+ 113 1/4	+ 46 1/2
5	75 1/2	93	5	+ 115 1/4	+ 49 1/2
5 1/2	77 1/2	98	5 1/2	+ 117 1/4	+ 52 1/2
6	79 1/2	103	6	+ 119 1/4	+ 55 1/2
6 1/2	81 1/2	108	6 1/2	+ 121 1/4	+ 58 1/2
7	83 1/2	113	7	+ 123 1/4	+ 61 1/2
7 1/2	85 1/2	118	7 1/2	+ 125 1/4	+ 64 1/2
8	87 1/2	123	8	+ 127 1/4	+ 67 1/2
8 1/2	89 1/2	128	8 1/2	+ 129 1/4	+ 70 1/2
9	91 1/2	133	9	+ 131 1/4	+ 73 1/2
9 1/2	93 1/2	138	9 1/2	+ 133 1/4	+ 76 1/2
10	95 1/2	143	10	+ 135 1/4	+ 79 1/2
10 1/2	97 1/2	148	10 1/2	+ 137 1/4	+ 82 1/2
11	99 1/2	153	11	+ 139 1/4	+ 85 1/2
11 1/2	101 1/2	158	11 1/2	+ 141 1/4	+ 88 1/2
12	103 1/2	163	12	+ 143 1/4	+ 91 1/2
12 1/2	105 1/2	168	12 1/2	+ 145 1/4	+ 94 1/2
13	107 1/2	173	13	+ 147 1/4	+ 97 1/2
13 1/2	109 1/2	178	13 1/2	+ 149 1/4	+ 100 1/2
14	111 1/2	183	14	+ 151 1/4	+ 103 1/2
14 1/2	113 1/2	188	14 1/2	+ 153 1/4	+ 106 1/2
15	115 1/2	193	15	+ 155 1/4	+ 109 1/2
15 1/2	117 1/2	198	15 1/2	+ 157 1/4	+ 112 1/2
16	119 1/2	203	16	+ 159 1/4	+ 115 1/2
16 1/2	121 1/2	208	16 1/2	+ 161 1/4	+ 118 1/2
17	123 1/2	213	17	+ 163 1/4	+ 121 1/2
17 1/2	125 1/2	218	17 1/2	+ 165 1/4	+ 124 1/2
18	127 1/2	223	18	+ 167 1/4	+ 127 1/2
18 1/2	129 1/2	228	18 1/2	+ 169 1/4	+ 130 1/2
19	131 1/2	233	19	+ 171 1/4	+ 133 1/2
19 1/2	133 1/2	238	19 1/2	+ 173 1/4	+ 136 1/2
20	135 1/2	243	20	+ 175 1/4	+ 139 1/2
20 1/2	137 1/2	248	20 1/2	+ 177 1/4	+ 142 1/2
21	139 1/2	253	21	+ 179 1/4	+ 145 1/2
21 1/2	141 1/2	258	21 1/2	+ 181 1/4	+ 148 1/2
22	143 1/2	263	22	+ 183 1/4	+ 151 1/2
22 1/2	145 1/2	268	22 1/2	+ 185 1/4	+ 154 1/2
23	147 1/2	273	23	+ 187 1/4	+ 157 1/2
23 1/2	149 1/2	278	23 1/2	+ 189 1/4	+ 160 1/2
24	151 1/2	283	24	+ 191 1/4	+ 163 1/2
24 1/2	153 1/2	288	24 1/2	+ 193 1/4	+ 166 1/2
25	155 1/2	293	25	+ 195 1/4	+ 169 1/2
25 1/2	157 1/2	298	25 1/2	+ 197 1/4	+ 172 1/2
26	159 1/2	303	26	+ 199 1/4	+ 175 1/2
26 1/2	161 1/2	308	26 1/2	+ 201 1/4	+ 178 1/2
27	163 1/2	313	27	+ 203 1/4	+ 181 1/2
27 1/2	165 1/2	318	27 1/2	+ 205 1/4	+ 184 1/2
28	167 1/2	323	28	+ 207 1/4	+ 187 1/2
28 1/2	169 1/2	328	28 1/2	+ 209 1/4	+ 190 1/2
29	171 1/2	333	29	+ 211 1/4	+ 193 1/2
29 1/2	173 1/2	338	29 1/2	+ 213 1/4	+ 196 1/2
30	175 1/2	343	30	+ 215 1/4	+ 199 1/2
30 1/2	177 1/2	348	30 1/2	+ 217 1/4	+ 202 1/2
31	179 1/2	353	31	+ 219 1/4	+ 205 1/2
31 1/2	181 1/2	358	31 1/2	+ 221 1/4	+ 208 1/2
32	183 1/2	363	32	+ 223 1/4	+ 211 1/2
32 1/2	185 1/2	368	32 1/2	+ 225 1/4	+ 214 1/2
33	187 1/2	373	33	+ 227 1/4	+ 217 1/2
33 1/2	189 1/2	378	33 1/2	+ 229 1/4	+ 220 1/2
34	191 1/2	383	34	+ 231 1/4	+ 223 1/2
34 1/2	193 1/2	388	34 1/2	+ 233 1/4	+ 226 1/2
35	195 1/2	393	35	+ 235 1/4	+ 229 1/2
35 1/2	197 1/2	398	35 1/2	+ 237 1/4	+ 232 1/2
36	199 1/2	403	36	+ 239 1/4	+ 235 1/2
36 1/2	201 1/2	408	36 1/2	+ 241 1/4	+ 238 1/2
37	203 1/2	413	37	+ 243 1/4	+ 241 1/2
37 1/2	205 1/2	418	37 1/2	+ 245 1/4	+ 244 1/2
38	207 1/2	423	38	+ 247 1/4	+ 247 1/2
38 1/2	209 1/2	428	38 1/2	+ 249 1/4	+ 250 1/2
39	211 1/2	433	39	+ 251 1/4	+ 253 1/2
39 1/2	213 1/2	438	39 1/2	+ 253 1/4	+ 256 1/2
40	215 1/2	443	40	+ 255 1/4	+ 259 1/2
40 1/2	217 1/2	448	40 1/2	+ 257 1/4	+ 262 1/2
41	219 1/2	453	41	+ 259 1/4	+ 265 1/2
41 1/2	221 1/2	458	41 1/2	+ 261 1/4	+ 268 1/2
42	223 1/2	463	42	+ 263 1/4	+ 271 1/2
42 1/2	225 1/2	468	42 1/2	+ 265 1/4	+ 274 1/2
43	227 1/2	473	43	+ 267 1/4	+ 277 1/2
43 1/2	229 1/2	478	43 1/2	+ 269 1/4	+ 280 1/2
44	231 1/2	483	44	+ 271 1/4	+ 283 1/2
44 1/2	233 1/2	488	44 1/2	+ 273 1/4	+ 286 1/2
45	235 1/2	493	45	+ 275 1/4	+ 289 1/2
45 1/2	237 1/2	498	45 1/2	+ 277 1/4	+ 292 1/2
46	239 1/2	503	46	+ 279 1/4	+ 295 1/2
46 1/2	241 1/2	508	46 1/2	+ 281 1/4	+ 298 1/2
47	243 1/2	513	47	+ 283 1/4	+ 301 1/2
47 1/2	245 1/2	518	47 1/2	+ 285 1/4	+ 304 1/2
48	247 1/2	523	48	+ 287 1/4	+ 307 1/2
48 1/2	249 1/2	528	48 1/2	+ 289 1/4	+ 310 1/2
49	251 1/2	533	49	+ 291 1/4	+ 313 1/2
49 1/2	253 1/2	538	49 1/2	+ 293 1/4	+ 316 1/2
50	255 1/2	543	50	+ 295 1/4	+ 319 1/2
50 1/2	257 1/2	548	50 1/2	+ 297 1/4	+ 322 1/2
51	259 1/2	553	51	+ 299 1/4	+ 325 1/2
51 1/2	261 1/2	558	51 1/2	+ 301 1/4	+ 328 1/2
52	263 1/2	563	52	+ 303 1/4	+ 331 1/2
52 1/2	265 1/2	568	52 1/2	+ 305 1/4	+ 334 1/2
53	267 1/2	573	53	+ 307 1/4	+ 337 1/2
53 1/2	269 1/2	578	53 1/2	+ 309 1/4	+ 340 1/2
54	271 1/2	583	54	+ 311 1/4	+ 343 1/2
54 1/2	273 1/2	588	54 1/2	+ 313 1/4	+ 346 1/2
55	275 1/2	593	55	+ 315 1/4	+ 349 1/2
55 1/2	277 1/2	598	55 1/2	+ 317 1/4	+ 352 1/2
56	279 1/2	603	56	+ 319 1/4	+ 355 1/2
56 1/2	281 1/2	608	56 1/2	+ 321 1/4	+ 358 1/2
57	283 1/2	613	57	+ 323 1/4	+ 361 1/2
57 1/2	285 1/2	618	57 1/2	+ 325 1/4	+ 364 1/2
58	287 1/2	623	58	+ 327 1/4	+ 367 1/2
58 1/2	289 1/2	628	58 1/2	+ 329 1/4	+ 370 1/2
59	291 1/2	633	59	+ 331 1/4	+ 373 1/2
59 1/2	293 1/2	638	59 1/2	+ 333 1/4	+ 376 1/2
60	295 1/2	643	60	+ 335 1/4	+ 379 1/2
60 1/2	297 1/2	648	60 1/2	+ 337 1/4	+ 382 1/2
61	299 1/2	653	61	+ 339 1/4	+ 385 1/2
61 1/2	301 1/2	658	61 1/2	+ 341 1/4	+ 388 1/2
62	303 1/2	663	62	+ 343 1/4	+ 391 1/2
62 1/2	305 1/2	668	62 1/2	+ 345 1/4	+ 394 1/2
63	307 1/2	673	63	+ 347 1/4	+ 397 1/2
63 1/2	309 1/2	678	63 1/2	+ 349 1/4	+ 400 1/2
64	311 1/2	683	64	+ 351 1/4	+ 403 1/2
64 1/2	313 1/2	688	64 1/2	+ 353 1/4	+ 406 1/2
65	315 1/2	693	65	+ 355 1/4	+ 409 1/2
65 1/2	317 1/2	698	65 1/2	+ 357 1/4	+ 412 1/2
66	319 1/2	703	66	+ 359 1/4	+ 415 1/2
66 1/2	321 1/2	708	66 1/2	+ 361 1/4	+ 418 1/2
67	323 1/2	713	67	+ 363 1/4	+ 421 1/2
67 1/2	325 1/2	718	67 1/2	+ 365 1/4	+ 424 1/2
68	327 1/2	723	68	+ 367 1/4	+ 427 1/2
68 1/2	329 1/2	728	68 1/2	+ 369 1/4	+ 430 1/2
69	331 1/2	733	69	+ 371 1/4	+ 433 1/2
69 1/2	333 1/2	738	69 1/2	+ 373 1/4	+ 436 1/2
70	335 1/2	743	70	+ 375 1/4	+ 439 1/2
70 1/2	337 1/2	748	70 1/2	+ 377 1/4	+ 442 1/2
71	339 1/2	753	71	+ 379 1/4	+ 445 1/2
71 1/2	341 1/2	758	71 1/2	+ 381 1/4	+ 448 1/2
72	343 1/2	763	72	+ 383 1/4	+ 451 1/2
72 1/2	345 1/2	768	72 1/2	+ 385 1/4	+ 454 1/2
73	347 1/2	773	73	+ 387 1/4	+ 457 1/2
73 1/2	349 1/2	778	73 1/2	+ 389 1/4	+ 460 1/2
74	351 1/2	783	74	+ 391 1/4	+ 463 1/2
74 1/2	353 1/2	788	74 1/2	+ 393 1/4	+ 466 1/2
75	355 1/2	793	75	+ 395 1/4	+ 469 1/2
75 1/2	357 1/2	798	75 1/2	+ 397 1/4	+ 472 1/2
76	359 1/2	803	76	+ 399 1/4	+ 475 1/2
76 1/2	361 1/2	808	76 1/2	+ 401 1/4	+ 478 1/2
77	363 1/2	813	77	+ 403 1/4	+ 481 1/2
77 1/2	365 1/2	818	77 1/2	+ 405 1/4	+ 484 1/2
78	367 1/2	823	78	+ 407 1/4	+ 487 1/2
78 1/2	369 1/2	828	78 1/2	+ 409 1/4	+ 490 1/2
79	371 1/2	833	79	+ 411 1/4	+ 493 1/2
79 1/2	373 1/2	838	79 1/2	+ 413 1/4	+ 496 1/2
80	375 1/2	843	80	+ 415 1/4	+ 499 1/2
80 1/2	377 1/2	848	80 1/2	+ 417 1/4	+ 502 1/2
81	379 1/2	853	81	+ 419 1/4	+ 505 1/2
81 1/2	381 1/2	858	81 1/2	+ 421 1/4	+ 508 1/2
82	383 1/2	863	82	+ 423 1/4	+ 511 1/2
82 1/2	385 1/2	868	82 1/2	+ 425 1/4	+ 514 1/2
83	387 1/2	873	83	+ 427 1/4	+ 517 1/2
83 1/2	389 1/2	878	83 1/2	+ 429 1/4	+ 520 1/2
84	391 1/2	883	84	+ 431 1/4	+ 523 1/2
84 1/2	393 1/2	888	84 1/2	+ 433 1/4	+ 526 1/2
85	395 1/2	893	85	+ 435 1/4	+ 529 1/2
85 1/2	397 1/2	898	85 1/2	+ 437 1/4	+ 532 1/2
86	399 1/2	903	86	+ 439 1/4	+ 535 1/2
86 1/2	401 1/2	908	86 1/2	+ 441 1/4	+ 538 1/2
87	403 1/2	913	87	+ 443 1/4	+ 541 1/2
87 1/2	405 1/2	918	87 1/2	+ 445 1/4	+ 544 1/2
88	407 1/2	923	88	+ 447 1/4	+ 547 1/2
88 1/2	409 1/2	928	88 1/2	+ 449 1/4	+ 550 1/2
89	411 1/2	933	89	+ 451 1/4	+ 553 1/2
89 1/2	413 1/2	938	89 1/2	+ 453 1/4	+ 556 1/2
90	415 1/2	943	90	+ 455 1/4	+ 559 1/2

## BOLTS, NUTS, RIVETS AND SET SCREWS

**Bolts and Nuts**  
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List	
Machine bolts	70, 10, 10 and 10
Carriage bolts	70, 10, 10 and 10
Lag bolts	70, 10, 10 and 10
Flange bolts, Nos. 1, 2, 3 and 7	
heads	70, 10, 10 and 10
Hot-pressed nuts, blank or tapped	
square	70, 10, 10 and 10
Hot-pressed nuts, blank or tapped	
hexagons	70, 10, 10 and 10
C.p.c. and t. square or hex. nuts, blank or tapped	70, 10, 10 and 10
Semi-finished hexagon nuts U.S.S. all sizes	70, 10, 10 and 10
Semi-finished hexagon nuts, S.A.E.	
1/4 in. to 7/16 in. diameter	75 and 10
1/2 in. to 1 in. diameter	75
larger than 1 in. diameter	70
Store bolts in packages, Pittsburgh	75
Store bolts in packages, Chicago	75
Store bolts in packages, Cleveland	75
Store bolts in bulk, Pittsburgh	83
Store bolts in bulk, Chicago	83
Store bolts in bulk, Cleveland	83
Tire bolts	60 and 10

Large Rivets (1/2-in. and larger)	
F.o.b. Pittsburgh or Cleveland	\$2.90
F.o.b. Chicago	3.00
F.o.b. Birmingham	3.05

Small Rivets (7/16-in. and smaller)	
F.o.b. Pittsburgh	70 and 5
F.o.b. Cleveland	70 and 5
F.o.b. Chicago and Birmingham	70 and 5

Cap and Set Screws	
(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more)	
Per Cent Off List	
Milled cap screws, 1 in. dia. and smaller	75, 10 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75 and 10
Milled headless set screws, cut thread	
1/4 in. and smaller	75
Upset hex. head cap screws, U.S.S.S. or S.A.E. thread, 1 in. dia. and smaller	83
Upset set screws, cut and oval point	75 and 10
Milled studs	65

## Alloy and Stainless Steel

**Alloy Steel Ingots**  
F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.  
Uncropped .....\$40 per gross ton

**Alloy Steel Blooms, Billets and Slabs**  
F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.  
Base price, \$49 a gross ton.  
Price del'd Detroit is \$52.

Alloy Steel Bars	
F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.	
Open-hearth grade, hot rolled	2.45c.
Delivered price at Detroit is	2.60c.
S.A.E. Series	
Numbers	Differential per 100 lb.
2900 (1/2% Nickel)	0.25
3100 (2 1/4% Nickel)	0.55
3200 (3 1/4% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.30
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum) (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.40 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	base
4100 Chromium Vanadium Bar	1.20
4100 Chromium Vanadium Spring Steel	0.95
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars is 1/2c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2 1/2 in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

**Alloy Cold-Finished Bars**  
F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 2.95c. base per lb.

STAINLESS STEEL No. 302 (17 to 19% Cr. 7 to 9% Ni. 0.08 to 0.20% C)	
(Base Prices, f.o.b. Pittsburgh)	
Bars	Per Lb.
Plates	23c.
Sheets	36c.
Hot-rolled strip	33c.
Cold-rolled strip	20c.
	27c.

## Raw and Semi-Finished Steel

### Carbon Steel Re-rolling Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.  
Uncropped .....\$29 per gross ton

### Carbon Steel Forging Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Birmingham.  
Uncropped .....\$31 per gross ton

### Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.  
Per Gross Ton

Re-rolling .....\$27.00  
Forging quality .....32.00  
Delivered Detroit

Re-rolling .....\$30.00  
Forging .....35.00

### Billets Only F.o.b. Duluth

Re-rolling .....\$29.00  
Forging .....34.00

### Sheet Bars

F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.  
Per Gross Ton

Open-hearth or Bessemer .....\$28.00

### Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

Grooved .....Per Lb.  
Universal .....1.70c.  
Sheared .....1.70c.

### Tube Rounds

Base per Lb.  
F.o.b. Pittsburgh .....1.90c.  
F.o.b. Chicago .....1.85c.  
F.o.b. Cleveland .....1.85c.  
F.o.b. Buffalo .....1.90c.  
F.o.b. Birmingham .....1.95c.

### Wire Rods

(Common soft, base)

Per Gross Ton  
F.o.b. Pittsburgh .....\$38.00  
F.o.b. Cleveland .....38.00  
F.o.b. Chicago .....39.00  
F.o.b. Anderson, Ind. ....39.00  
F.o.b. Youngstown .....39.00  
F.o.b. Worcester, Mass. ....40.00  
F.o.b. Birmingham .....41.00  
F.o.b. San Francisco .....47.00

## CANADA

### Pig Iron

Per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75	\$21.00
No. 2 fdy., sil. 1.75 to 2.25	20.50
Malleable	21.00

Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75	\$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.00

## FERROALLOYS

### Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.  
Per Gross Ton  
Domestic, 80% (carload) .....\$35.00

### Spiegeleisen

Per Gross Ton Furnace  
Domestic, 19 to 21% .....\$26.00

### Electric Ferrosilicon

Per Gross Ton Delivered	
50% (carloads)	\$77.50
50% (ton lots)	85.00
75% (carloads)	126.00
75% (ton lots)	136.00
14% to 16% (f.o.b.) Welland	
Ont. (in carloads) (duty paid)	31.00
14% to 16% (less carloads)	38.50

### Silvery Iron

F.o.b. Jackson, Ohio, Furnace	
Per Gross Ton	Per Gross Ton
6% .....\$22.75	12% .....\$29.25
7% .....23.75	13% .....30.75
8% .....24.75	14% .....32.25
9% .....25.75	15% .....33.75
10% .....26.75	16% .....35.25
11% .....27.75	17% .....36.75

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed.

### Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace	
Per Gross Ton	Per Gross Ton
10% .....\$27.75	14% .....\$33.25
11% .....28.75	15% .....34.75
12% .....29.75	16% .....36.25
13% .....30.75	17% .....37.75

Manganese 1 1/4 to 3%, \$1 a ton additional. For each unit of manganese over 3%, \$1 a ton additional. Phosphorus 0.75% or over, \$1 ton additional.  
Base prices at Buffalo are \$1.25 a ton higher than at Jackson.

### Other Ferroalloys

Ferromanganese, per lb. contained W. del., carloads	\$1.35 to \$1.45
Ferromanganese, less carloads, 1.45 to 1.50	
Ferrocobalt, 4 to 6% carbon and up, 65 to 70% Cr. per lb. contained Cr. delivered, in carloads	10.00c.
Ferrocobalt, 2% carbon	16.50c. to 17.00c.
Ferrocobalt, 1% carbon	17.50c. to 18.00c.
Ferrocobalt, 0.10% carbon	19.50c. to 20.00c.
Ferrocobalt, 0.06% carbon	20.00c. to 20.50c.
Ferrocobalt, del. per lb. contained V.	\$2.70 to \$2.90
Ferrocobalt, 15 to 18% Ti, 6 to 8% C, f.o.b. furnace carload and contract per net ton	\$137.50
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with \$2 unitage	50.00
Ferrophosphorus, electric, 24% f.o.b. Anniston, Ala. per gross ton with \$2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del. 95c.	
Calcium molybdate, per lb. Mo., del.	80c.
Silico speigel, per ton, f.o.b. furnace, car lots	\$22.00
Ton lots or less, per ton	195.00
Silico-manganese, gross ton, delivered	
2.50% carbon grade	96.00
2% carbon grade	95.00
1% carbon grade	105.00
Spot prices	\$5 a ton higher

## Pig Iron and Ferroalloys

### PIG IRON

### PRICES PER GROSS TON AT BASING POINTS

Basing Points	No. 2 Fdry.	Malleable	Basic	Bessemer
Everett, Mass.	\$19.50	\$20.00	\$19.00	\$20.50
Bethlehem, Pa.	19.50	20.00	19.00	20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Steelton, Pa.	19.50	20.00	19.00	20.50
Sparrows Point, Md.	19.50	20.00	19.00	20.50
Neville Island, Pa.	18.50	18.50	18.00	19.00
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Youngstown	18.50	18.50	18.00	19.00
Buffalo	18.50	19.00	18.00	19.50
Erie, Pa.	18.50	19.00	18.00	19.00
Cleveland	18.50	18.50	18.00	19.00
Toledo, Ohio	18.50	18.50	18.00	19.00
Jackson, Ohio	20.25	20.25	19.75	20.25
Detroit	18.50	18.50	18.00	19.00
Hamilton, Ohio	18.50	18.50	18.00	19.00
Chicago	18.50	18.50	18.00	19.00
Granite City, Ill.	19.00	19.00	18.50	19.50
Duluth, Minn.	19.00	19.00	18.50	19.00
Birmingham	14.50	14.50	13.50	14.50
Provo, Utah	17.50			

### DELIVERED PRICES PER GROSS TON AT CONSUMING CENTERS

	No. 2 Fdry.	Malleable	Basic	Bessemer
Boston Switching District				
From Everett, Mass.	\$20.00	\$20.50	\$19.50	\$21.00
Brooklyn				
From East Pa. or Buffalo	21.77	22.27	21.27	22.77
Newark or Jersey City, N. J.	20.89	21.39	20.39	21.89
From East Pa. or Buffalo				
Philadelphia	20.26	20.76	19.76	21.26
From Eastern Pa.				
Cincinnati	19.51	19.51	19.01	20.01
From Hamilton, Ohio				
Canton, Ohio	19.76	19.76	19.26	20.26
From Cleveland and Youngstown				
Columbus, Ohio	20.50	20.50		
From Hamilton, Ohio				
Mansfield, Ohio	20.26	20.26		
From Cleveland and Toledo				
Indianapolis	20.77	20.77		
From Hamilton, Ohio				
South Bend, Ind.	20.55	20.55		
From Chicago				
Milwaukee	19.50	19.50		
From Chicago				
St. Paul	20.94			
From Duluth				
Davenport, Iowa	20.26	20.26		
From Chicago				
Kansas City	21.04	21.04		
From Granite City				

Delivered prices on Southern iron for shipment to Northern points are 38c. a gross ton below delivered prices from the nearest Northern basing points.

### LOW PHOSPHORUS PIG IRON

Basing points: Birdsboro, Pa., Steelton, Pa., and Sandusky, N. Y.	\$23.50
Johnson City, Tenn.	23.50
Del'd Chicago	29.15
Johnson City, Tenn. (off grade)	19.50

### GRAY FORGE PIG IRON

Valley furnace	\$18.25
CHARCOAL PIG IRON	
Lake Superior furnace	\$21.00
Delivered Chicago	24.04
Delivered Buffalo	24.28

# Iron and Steel Scrap

## PITTSBURGH

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$10.00 to \$10.50
No. 2 heavy melting steel	9.00 to 9.50
No. 2 railroad wrought	10.00 to 10.50
Scrap rails	10.00 to 10.50
Balls 3 ft. and under	13.50 to 14.00
Compressed sheet steel	10.00 to 10.50
Hand bundled sheet steel	9.00 to 9.50
Hvy. steel axle turnings	9.00 to 9.50
Machine shop turnings	6.75 to 7.25
Short shov. turnings	6.75 to 7.25
Short mixed borings and turnings	5.25 to 5.75
Cast iron borings	5.25 to 5.75
Cast iron car wheels	11.00 to 11.50
Heavy breakable cast	10.00 to 10.50
No. 1 cast	11.00 to 11.50
Railr. knuckles and couplers	13.00 to 13.50
Rail, coll and leaf springs	13.00 to 13.50
Roller steel wheels	13.00 to 13.50
Low phos. billet crops	13.00 to 13.50
Low phos. sheet bar crops	13.00 to 13.50
Low phos. plate scrap	12.50 to 13.00
Low phos. punchings	12.50 to 13.00
Steel car axles	13.00 to 13.50

## CHICAGO

Delivered Chicago district consumers:	
Per Gross Ton	
Heavy melting steel	\$8.50 to \$9.00
Automobile hvy. melt. steel	8.00 to 8.50
Shoveling steel	8.50 to 9.00
Hydraulic comp. sheets	7.50 to 8.00
Drop forge flashings	6.50 to 7.00
No. 1 busheling	7.00 to 7.50
Roller car wheels	10.00 to 10.50
Railroad tires	10.00 to 10.50
Railroad leaf springs	10.00 to 10.50
Steel couplers and knuckles	10.00 to 10.50
Coil springs	10.50 to 11.00
Steel turnings (elec. fur.)	8.00 to 8.50
Low phos. punchings	10.00 to 10.50
and under	10.00 to 10.50
Cast iron borings	4.50 to 5.00
Short shoveling turnings	4.50 to 5.00
Machine shop turnings	4.25 to 4.75
Rerolling rails	10.00 to 10.50
Steel rails, less than 3 ft.	10.75 to 11.25
Steel rails, less than 2 ft.	11.50 to 12.00
Angle bars, steel	9.50 to 10.00
Cast iron car wheels	9.50 to 10.00
Railroad malleable	9.00 to 9.50
Agricultural malleable	7.75 to 8.25

## Per Net Ton

Iron car axles	\$12.00 to \$12.50
Steel car axles	10.00 to 10.50
No. 1 railroad wrought	7.00 to 7.50
No. 2 railroad wrought	7.50 to 8.00
No. 2 busheling	3.50 to 4.00
Locomotive tires, smooth	9.00 to 9.50
Pipe and flues	4.50 to 5.00
No. 1 machinery cast	8.00 to 8.50
Clean automobile cast	8.00 to 8.50
No. 1 railroad cast	7.50 to 8.00
No. 1 agricultural cast	7.00 to 7.50
Store plate	5.25 to 5.75
Grate bars	4.75 to 5.25
Brake shoes	6.00 to 6.50

## PHILADELPHIA

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$9.25 to \$9.75
No. 2 heavy melting steel	\$8.00 to 8.50
No. 1 railroad wrought	\$11.00 to 11.50
Bundled sheets	9.00
Hydraulic compressed, new	9.00 to 9.50
Hydraulic compressed, old	8.50 to 9.00
Machine shop turnings	5.50 to 6.00
Heavy axle turnings	8.50 to 9.00
Cast borings	5.00 to 5.50
Heavy breakable cast	9.50 to 10.00
Store plate (steel work)	10.00 to 10.50
No. 1 low phos. heavy	13.00 to 14.00
Couplers and knuckles	12.50 to 13.00
Roller steel wheels	12.50 to 13.00
No. 1 blast furnace	5.00 to 5.50
Spec. iron and steel pipe	8.00
Shafting	15.00 to 16.00
Steel axles	14.50
No. 1 forge fire	9.00
Cast iron car wheels	11.00 to 11.50
No. 1 cast	11.50 to 12.00
Cast borings (chem.)	12.00 to 14.00
Steel rails for rolling	12.00

## CINCINNATI

Dealers' buying prices per gross ton:	
Heavy melting steel	\$6.75 to \$7.25
Scrap rails for melting	8.00 to 8.50
Loose sheet clippings	3.00 to 3.50
Bundled sheets	5.50 to 6.00
Cast iron borings	4.50 to 5.00
Machine shop turnings	4.00 to 4.50
No. 1 busheling	5.50 to 6.00
No. 2 busheling	2.50 to 3.00
Rails for rolling	8.50 to 9.00
No. 1 locomotive tires	8.25 to 8.75
Short rails	11.00 to 11.50
Cast iron car wheels	7.50 to 8.00
No. 1 machinery cast	8.75 to 9.25
No. 1 railroad cast	8.25 to 8.75
Burnt cast	5.75 to 6.25
Store plate	5.75 to 6.25
Agricultural malleable	7.75 to 8.25
Railroad malleable	7.75 to 8.25

## CLEVELAND

Per gross ton delivered consumers' yards:	
No. 1 heavy melting steel	\$8.00 to \$8.50
No. 2 heavy melting steel	7.50 to 8.00
Compressed sheet steel	7.25 to 7.75
Light bundled sheet stampings	6.50 to 7.00
Drop forge flashings	7.00 to 7.50
Machine shop turnings	6.00 to 6.50
Short shoveling turnings	6.50 to 7.00
No. 1 busheling	7.00 to 7.50
Steel axle turnings	7.00 to 7.50
Low phos. billet crops	12.50 to 13.00
Cast iron borings	6.25 to 6.75
Mixed borings and short turnings	6.25 to 6.75
No. 2 busheling	6.25 to 6.75
No. 1 cast	10.50 to 11.00
Railroad grate bars	7.00 to 7.50
Store plate	6.50 to 7.00
Rails for rolling	12.50 to 13.00
Rails for rolling	15.50 to 16.00
Railroad malleable	11.50 to 12.00
Cast iron car wheels	9.75 to 10.00

## BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:	
No. 1 heavy melting steel	\$10.00 to \$10.50
No. 2 heavy melting steel	8.50 to 9.00
Scrap rails	8.50 to 9.00
New hydraulic comp. sheets	8.50 to 9.00
Old hydraulic comp. sheets	7.50 to 8.00
Drop forge flashings	8.50 to 9.00
No. 1 busheling	8.50 to 9.00
Hvy. steel axle turnings	6.50 to 7.00
Machine shop turnings	5.00 to 5.50
Knuckles and couplers	11.00 to 11.50
Coil and leaf springs	11.00 to 11.50
Roller steel wheels	11.00 to 11.50
Low phos. billet crops	11.50 to 12.00
Short shov. steel turnings	5.50 to 6.00
Short mixed borings and turnings	5.50 to 6.00
Cast iron borings	5.50 to 6.00
No. 2 busheling	5.00 to 5.50
Steel car axles	10.50 to 11.00
Iron axles	10.50 to 11.00
No. 1 machinery cast	10.50 to 11.00
No. 1 cupola cast	9.00 to 9.50
Store plate	8.50 to 8.75
Steel rails, 3 ft. and under	12.00 to 12.50
Cast iron car wheels	10.00 to 10.50
Industrial malleable	10.50 to 11.00
Railroad malleable	10.50 to 11.00
Chemical borings	7.00 to 7.50

## BOSTON

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	\$5.50 to \$6.00
Scrap T rails	5.50 to 6.00
No. 2 steel	5.00 to 5.25
Breakable cast	6.00 to 6.25
Machine shop turnings	1.25 to 1.50
Bundled skeleton	3.75 to 4.00
Forge flashings	4.25 to 4.50
Blast furnace scrap	2.00 to 2.50
Shafting	11.00 to 11.25
Steel car axles	10.50 to 11.00
Cast iron borings, chemical	6.00 to 7.00
Store plate	6.50

Per gross ton delivered consumers' yards:	
Textile cast	\$7.50 to \$9.00
No. 1 machinery cast	7.50 to 9.00
Railroad malleable	11.00 to 11.50

## NEW YORK

Dealers' buying prices per gross ton:	
No. 1 heavy melting steel	\$7.00 to \$8.00
No. 2 heavy melting steel	\$5.50 to \$6.50
Heavy breakable cast	6.00 to 6.50
No. 1 machinery cast	7.00 to 7.50
No. 2 cast	6.25 to 6.75
Store plate	5.50 to 6.00
Steel car axles	11.50 to 12.00
No. 1 railroad wrought	7.50 to 8.00
No. 1 yard wrought, long	6.50 to 7.00
Spec. iron and steel pipe	4.50 to 5.00
Rails for rerolling	8.50 to 8.75
Short shoveling turnings	2.50 to 3.00
Machine shop turnings	2.50 to 3.00
Cast borings	3.50 to 3.75
No. 1 blast furnace	2.00 to 2.50
Cast borings (chemical)	11.00 to 11.50
Unprepared yard iron and steel	3.00 to 4.00

Per gross ton, delivered local foundries:	
No. 1 machinery cast	\$10.25
No. 1 hvy. cast (cupola size)	9.00
No. 2 cast	8.00

\*For direct car loading only.  
†Loading on barge.

## BIRMINGHAM

Per gross ton delivered consumers' yards:	
Heavy melting steel	\$9.00
Scrap steel rails	10.00
Short shoveling turnings	6.50
Store plates	6.50
Steel axles	\$10.50 to 11.00
Iron axles	10.50 to 11.00
No. 1 railroad wrought	5.50
Rails for rolling	11.00
No. 1 cast	10.50
Tramcar wheels	9.00 to 9.50
Cast iron borings, chem.	8.00

## ST. LOUIS

Per gross ton delivered consumers' yards:	
Selected heavy steel	\$8.75 to \$9.25
No. 1 heavy melting	7.00 to 7.50
No. 2 heavy melting	6.50 to 7.00
No. 1 locomotive tires	9.50 to 10.00
Misc. stand-sec. rails	8.75 to 9.25
Railroad springs	9.00 to 9.50
Bundled sheets	6.00 to 6.50
No. 2 railroad wrought	8.00 to 8.50
No. 1 busheling	5.00 to 5.50
Cast iron borings and shoveling turnings	2.50 to 3.00
Rails for rolling	9.75 to 10.25
Machine shop turnings	2.50 to 3.00
Heavy turnings	5.50 to 6.00
Steel car axles	10.50 to 11.00
Iron car axles	12.50 to 13.00
No. 1 railroad wrought	5.50 to 6.00
Steel rails less than 3 ft.	10.75 to 11.25
Steel angle bars	9.00 to 9.50
Cast iron car wheels	7.50 to 8.00
No. 1 machinery cast	8.50 to 9.00
Railroad malleable	8.50 to 9.00
No. 1 railroad cast	8.50 to 9.00
Store plate	6.50 to 7.00
Agric. malleable	8.50 to 9.00

## DETROIT

Dealers' buying prices per gross ton:	
Heavy melting steel	\$6.75 to \$7.25
Borings and short turnings	4.75 to 5.25

## ORES, FLUORSPAR, COKE, FUEL, REFRACTORIES

### Lake Superior Ores

#### Delivered Lower Lake Ports

Per Gross Ton	
Old range, Bessemer, 51.5% iron	\$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi, Bessemer, 51.50% iron	4.85
Mesabi, non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40

### Foreign Ore

#### C.A.F. Philadelphia or Baltimore

Per Unit	
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Alania	9.50c.
Iron, low phos. Swedish, average 68 1/2% iron	9.50c.
Iron, basic or foundry, Swedish, aver. 65% iron	9c.
Iron, basic or foundry, Russian, aver. 65% iron	9c.
Manganese, Caucasian, washed 52% manganese, African, Indian, 44-48%	21c.
Manganese, African, Indian, 49-51%	24c.
Manganese, Brazilian, 46 to 48 1/2%	20c.

#### Per Net Ton Unit

Tungsten, Chinese, wolframite, duty paid, delivered*	\$17.50 to \$18.50
Tungsten, domestic scheelite, delivered†	17.00

#### Per Gross Ton

Chrome, 45%, Cr <sub>2</sub> O <sub>3</sub> , crude, c.i.f. Atlantic Seaboard	\$17.00
Chrome 48%, Cr <sub>2</sub> O <sub>3</sub> , c.i.f. Atlantic Seaboard	20.00

\*Quotations nominal in absence of sales.  
†Nominal; no supplies available.

### Fluorspar

Per Net Ton	
Domestic, washed gravel, 85-5 f.o.b. Kentucky and Illinois mines for all-rail shipment	\$15.50 to \$16.00
Same grade for Ohio River barge shipment for Kentucky and Illinois River landings	17.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	\$15.50 to 16.00
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	19.00
Domestic, No. 1 ground bulk, 98 to 98 1/2% calcium fluoride, not over 2 1/2% silicon, f.o.b. Illinois and Kentucky mines	30.00

## COKE, COAL AND FUEL OIL

### Coke

Per Net Ton	
Furnace, f.o.b. Connellsville Prompt	\$3.85
Foundry, f.o.b. Connellsville Prompt	\$4.60 to 5.10
Foundry, by-product, Chicago ovens, for delivery outside switching district	8.50
Foundry, by-product, delivered in Chicago switching district	9.25
Foundry, by-product, New England, delivered	11.00
Foundry, by-product, Newark or Jersey City, del'd	8.20 to 8.81
Foundry, by-product, Phila.	9.90

Long turnings	\$3.75 to \$4.25
No. 1 machinery cast	9.00 to 9.50
Automotive cast	9.75 to 10.25
Hydraulic comp. sheets	6.75 to 7.25
Store plate	6.25 to 6.75
New factory busheling	5.75 to 6.25
Old No. 2 busheling	4.00 to 4.50
Sheet clippings	3.00 to 3.50
Flashings	5.50 to 6.00
Low phos. plate scrap	7.00 to 7.50

## CANADA

### Dealers' buying prices per gross ton:

Toronto Montreal	
Heavy melting steel	\$5.50 \$5.50
Rails scrap	6.00 4.50
Machine shop turnings	2.50 2.50
Boiler plate	4.50 4.50
Heavy axle turnings	2.50 2.50
Cast borings	3.00 3.00
Steel borings	2.00 2.00
Wrought pipe	2.50 2.50
Steel axles	4.50 6.00
Axles wrought iron	4.50 6.50
No. 1 machinery cast	7.75 9.00
Store plate	4.50 5.00
Standard car wheels	7.25 7.00
Malleable	6.75 7.00

Foundry, by-product, Cleveland, delivered	\$9.25
Foundry, Birmingham	6.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry, by-product, del'd St. Louis	9.00

### Coal

Per Net Ton	
Mine run steam coal, f.o.b. W. Pa. mines	\$1.80 to \$2.05
Mine run coking coal f.o.b. W. Pa. mines	2.05 to 2.25
Gas coal, 1/2-in. f.o.b. Pa. mines	2.25 to 2.55
Mine run gas coal f.o.b. Pa. mines	2.05 to 2.45
Steam slack, f.o.b. W. Pa. mines	1.55 to 1.65
Gas slack, f.o.b. W. Pa. mines	1.90 to 2.10

### Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.	
No. 3 distillate	4.00c.
No. 4 industrial	3.50c.

#### Per Gal. f.o.b. Baltimore

No. 3 distillate	4.00c.
No. 4 industrial	3.50c.

#### Per Gal. del'd Chicago

No. 3 industrial fuel oil	3.88c.
No. 5 industrial fuel oil	3.88c.

#### Per Gal. f.o.b. Cleveland

No. 3 distillate	5.50c.
No. 4 industrial	5.25c.
No. 5 industrial	4.35c.

## REFRACTORIES

### Fire Clay Brick

Per 1000 f.o.b. Works	
High-heat Intermediate Duty Brick	
Pennsylvania	\$45.00
Maryland	45.00
New Jersey	55.00
Ohio	45.00
Kentucky	45.00
Missouri	45.00
Illinois	45.00
Ground fire clay, per ton	7.00

### Chrome Brick

Per Net Ton	
Standard size	\$45.00

### Silica Brick

Per 1000 f.o.b. Works	
Pennsylvania	\$45.00
Chicago	54.00
Birmingham	55.00
Silica clay, per ton	8.00

### Magnesite Brick

Per Net Ton	
Standard size, burned, f.o.b. Baltimore and Chester, Pa.	\$65.00
Unburned, f.o.b. Baltimore	58.00
Imported grain magnesite, f.o.b. Baltimore and Chester, Pa.	45.00
Domestic grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00</

# Warehouse Prices for Steel Products

## PITTSBURGH

	Base per Lb.
Plates	3.15c
Structural shapes	3.15c
Soft steel bars and small shapes	2.90c
Reinforcing steel bars	2.90c
Cold-finished and screw stock	
Rounds and hexagons	3.45c
Squares and flats	3.45c
Hoops and bands under 1/4 in.	3.20c
Hot-rolled annealed sheets (No. 24)	
25 or more bundles	3.30c
Galv. sheets (No. 24), 25 or more	
bundles	3.95c
Hot-rolled sheets (No. 10)	2.95c
Galv. corrug. sheets (No. 28), per	
square (more than 3750 lb.)	\$3.69
Spikes, large	2.90c
Track bolts, all sizes, per 100 count,	
65 per cent off list.	
Machine bolts, 100 count,	
65 per cent off list.	
Carriage bolts, 100 count,	
65 per cent off list.	
Nuts, all styles, 100 count,	
65 per cent off list.	
Large rivets, base per 100 lb.	\$3.50
Wire, black, soft ann't'd, base per	
100 lb.	\$2.70c
Wire, galv. soft, base per 100 lb.	\$2.95c
Common wire nails, per keg	\$2.83c
Cement coated nails, per keg	\$2.83c

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 9999 lb.

\*Delivered in Pittsburgh switching district.

## CHICAGO

	Base per Lb.
Plates and structural shapes	3.20c
Soft steel bars	2.95c
Cold-fin. steel bars and shafting:	
Rounds and hexagons	3.50c
Flats and squares	3.50c
Hot-rolled strip	3.30c
Hot-rolled annealed sheets (No. 24)	3.85c
Galv. sheets (No. 24)	4.55c
Hot-rolled sheets (No. 10)	3.05c
Spikes (9/16 in. and lighter)	3.50c
Track bolts	4.55c
Rivets, structural (keg lots)	3.50c
Rivets, boiler (keg lots)	3.60c
Machine bolts	60 and 5
Carriage bolts	60 and 5
Coach and lag screws	60 and 5
Hot-pressed nuts, sq. tap, or	
blank	60 and 5
Hot-pressed nuts, hex. tap or	
blank	60 and 5
Hex. head and cap screws	80
Cup point set screws	70 and 10
Flat head bright wood screws	37 1/2 and 10
Spring cotter pins	70 and 10
Store bolts in full packages	70 and 10
Rd. hd. tank rivets, 7/16 in. and	
smaller	57 1/2
Wrought washers	\$4.50 off list
No. 8 black ann't'd wire per 100 lb.	\$3.85
Com. wire nails, base per keg	3.95c
Cement c'd nails, base per keg	3.95c

## NEW YORK

	Base per Lb.
Plates, 1/4 in. and heavier	3.40c
Structural shapes	3.37c
Soft steel bars, small shapes	3.22c
Iron bars	3.22c
Iron bars, swed. charcoal	6.50c to 7.25c
Cold-fin. shafting and screw stock:	
Rounds and hexagons	3.92c
Flats and squares	4.42c
Cold-roll. strip, soft and quarter	
hard	3.32c
Hoops	3.52c
Bands	3.52c
Hot-rolled sheets (No. 10)	3.27c
Hot-rolled ann't'd sheets (No. 24)	3.85c
Galvanized sheets (No. 24)	4.50c
Long term sheets (No. 24)	5.20c
Standard tool steel	11.00c
Wire, black annealed (No. 10)	3.25c
Wire, galv. (No. 10)	3.85c
Tire steel, 1 x 1/4 in. and larger	3.65c
Open hearth spring steel	4.00c to 10.00c
Common wire nails, base, per keg	\$3.21

	Per Cent Off List
Machine bolts, cut thread:	
All diameters	70
Carriage bolts, cut thread:	
All diameters	70
Roller tubes:	Per 100 Ft.
Lap welded, 2-in.	\$18.05
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron, 4-in.	63.65

\*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

## ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.44c
Bars, soft steel or iron	3.19c
Cold-fin. rounds, shafting, screw	
stock	3.74c
Hot-rolled annealed sheets (No. 24)	4.09c
Galv. sheets (No. 24)	4.79c
Hot-rolled sheets (No. 10)	3.29c
Black corrug. sheets (No. 24)	4.09c
*Galv. corrug. sheets	4.79c
Structural rivets	3.99c
Boiler rivets	4.09c
Tank rivets, 7/16 in. and smaller	55
Machine and carriage bolts, lag screws,	
fittings up bolts, bolt ends, plow bolts,	
hot-pressed nuts, square and hexagon,	
tapped or blank, semi-finished nuts:	
1000 lb. or over	60 and 5
200 to 999 lb.	69
100 to 199 lb.	55
Less than 100 lb.	50

\*No. 26 and lighter take special prices.

## PHILADELPHIA

	Base per Lb.
*Plates, 1/4-in. and heavier	2.95c
*Structural shapes	2.95c
*Soft steel bars, small shapes, iron	
bars (except bands)	2.90c
*Reinforce. steel bars, sq. twisted	
and deformed	2.955c
*Cold-finished steel bars	3.73c
*Steel hoops	3.40c
*Steel bands, No. 12 and 3/16 in.	
incl.	3.15c
Spring steel	5.00c
*Hot-rolled anneal. sheets (No. 24)	3.55c
*Galvanized sheets (No. 24)	4.25c
*Hot-rolled annealed sheets (No.	
10)	3.05c
Diam. pat. floor plates, 1/4 in.	4.95c
Swedish iron bars	6.25c

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

\*Base prices subject to deduction on orders aggregating 4000 lb. or over.

†For 50 bundles or over.

‡For less than 2000 lb.

## CLEVELAND

	Base per Lb.
Plates and struc. shapes	3.31c
Soft steel bars	2.95c
Reinforce. steel bars	*2.10c
Cold-finished steel bars	3.40c
Flat-rolled steel under 1/4 in.	3.36c
Cold-finished strip	3.00c
Hot-rolled annealed sheets (No. 24)	3.96c
Galvanized sheets (No. 24)	4.61c
Hot rolled sheets (No. 10)	3.11c
Hot-rolled 3/16 in. 24 to 48 in. wide	
sheets	3.56c
Black ann't'd wire, per 100 lb.	\$2.65
No. 9 galv. wire, per 100 lb.	3.00
Com. wire nails, base per keg	2.40

\*Plus mill. size and quantity extras.

†Outside delivery 10c. less.

## CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.40c
Bars, soft steel or iron	3.15c
New billet reinforce. bars	3.25c
Rail steel reinforce. bars	3.25c
Hoops and bands, 3/16 in. and	
lighter	3.45c
Cold-finished bars	3.70c
Hot-rolled annealed sheets (No. 24)	4.09c
Galv. sheets (No. 24)	4.70c
Hot-rolled sheets (No. 10)	3.20c
Structural rivets	4.35c
Small rivets	55 per cent off list
No. 9 ann't'd wire, per 100 lb. (1000	
lb. or over)	\$2.91
Com. wire nails, base per keg (1	
to 24 kegs)	3.50
25 to 50 kegs	3.30
Larger quantities	3.10
Cement c'd nails, base 100-lb. keg	3.50
Chain, 1-in., per 100 lb.	3.35
Net per 100 Ft.	
Seamless steel boiler tubes, 2-in.	\$19.03
4-in.	44.96
Lap-welded steel boiler tubes, 2-in.	18.10
4-in.	42.32

## BUFFALO

	Base per Lb.
Plates	3.37c
Struc. shapes	3.25c
Soft steel bars	3.00c
Reinforcing bars	2.60c
Cold-fin. flats and sq.	3.55c
Round and hex.	3.55c
Cold-rolled strip steel	3.39c
Hot-rolled annealed sheets (No. 24)	4.05c
Heavy hot-rolled sheets, 3/16 in.	
24 to 48 in. wide	3.62c
Galv. sheets (No. 24)	4.65c
Bands	3.42c
Hoops	3.42c
Hot-rolled unannealed sheets	3.17c
Com. wire nails, base per keg	\$3.35
Black wire, base per 100 lb.	3.45c

## BOSTON

	Per Lb.
Beams, channels, angles, tees, zees	3.52c
H. beams and shapes	3.52c*
Plates—sheared, tank and univ.	
mill, 1/4 in. thick and heavier	3.52c*
Floor plates, diamond pattern	5.33c
Bar and bar shapes (mild steel)	3.30c
Bands 3/16 in. thick and	
No. 12 ga. incl.	3.60c to 4.60c
Half rounds, half ovals, ovals and	
bevels	4.55c
Tire steel	4.55c
Cold-finished rounds and hexagons	5.25c*
Cold-rolled strip steel	3.245c
Cold-finished squares and flats	5.75c
Blue annealed sheets, No. 10 gal.	3.60c
One pass cold-rolled sheets No. 24	
ga.	4.15c
Galvanized steel sheets, No. 24 ga.	4.85c
Lead coated sheets, No. 24 ga.	5.80c

Prices delivered by truck in metropolitan Boston, subject to quantity differentials.

\*Base.

## PACIFIC COAST

	Base per Lb.
	San Francisco Los Angeles Seattle
Plates, tank and	3.55c 3.70c 3.55c
U. M.	3.55c 3.70c 3.55c
Shapes, standard	3.55c 3.70c 3.55c
Soft steel bars	3.55c 3.70c 3.55c
Reinforcing bars	3.50c 3.50c 3.50c
Hot-rolled annealed	
sheets (No. 24)	4.40c 4.45c 4.40c
Hot - rolled sheets	
(No. 10)	3.75c 3.80c 3.75c
Galv. sheets (No.	
24)	5.00c 5.05c 5.00c
Cold finished steel:	
Rounds	5.95c 5.95c 4.75c
Squares and	
hexagons	7.20c 7.20c 6.00c
Plates	7.00c 7.00c 7.00c
Common wire nails	
—base per keg	
—less carload	\$3.40 \$3.25 \$3.35

All items subject to differentials for quantity.

## Fabricators to Discuss Code at Convention

THE code of fair competition will come up for discussion at the twelfth annual convention of the American Institute of Steel Construction to be held at the Edgewater Beach Hotel, Chicago, Oct. 25 and 26. On Oct. 24, the day before the opening of the convention, there will be a joint conference at the same hotel of a number of traffic committees who are discussing a plan to oppose the general freight rate advance proposed by the railroads of the country on structural plates and shapes and on fabricated structural steel. The roads have

not only proposed a general freight rate advance on these commodities but in Official Classification territory it is proposed to double the fabricating-in-transit charge.

On Oct. 25, immediately following dinner, there will be a conference with mill executives representing the American Iron and Steel Institute. At this conference will be given a report on negotiations with the mills on the subject of quantity extras on plates and shapes and on the question of Regulations 9, requiring the prepayment of freight on plates and shapes purchased from the mill to be delivered to the final destination when intended for an identified job.

## Regulations Proposed for Interstate Truck Traffic

A 12-point program for the regulation of interstate truck traffic is proposed in a report of the highway transportation committee of the National Industrial Traffic League. The report will be presented for a vote of the general membership of the league at its annual meeting, to be held in New York, Nov. 14 and 15. The league's committee expressly states that it does not recommend any specific bill, but intends to judge legislation on the basis of these points.

# Copper, Lead and Spelter More Active For Brief Period—Tin Continues Dull

Zinc Price More Stable at 3.80c.—Lead Demand Steady With  
Five Point Range in Quotations—Copper Sales  
Above September Level

**N**EW YORK, Oct. 16.—The brief inflation scare last week developed heavier demand for copper, as well as for the other non-ferrous metals, but repudiation of such plans brought the natural reaction. Sales of copper on Thursday may have been as high as 1500 tons, but daily transactions have again declined and now average less than 500 tons. While this is considerably above the extremely low level of activity which prevailed in September, it is not believed to equal the current rate of consumption and users are rapidly reaching the point where they must buy more heavily to meet their day-to-day needs. The Blue Eagle price remains firm at 9c. a lb., Connecticut Valley, and the London market is somewhat stronger than was the case one week ago. The pound strengthened at the expense of the dollar on inflation rumors, and, even

though it has since declined again, copper was quoted this morning at 6.40c. a lb., c.i.f. usual Continental ports.

## Tin

This market is unusually stagnant with prices fluctuating over a narrow range. Straits metal is quotable today at 50.95c. a lb., New York, compared with 50.75c. a lb. one week ago. The fluctuation of the pound last week had little effect upon prices and less upon demand. Consumers are showing no interest in their future requirements, and with tin plate operations tending to ease off, consumption is not likely to increase very much before the first of the year. On first call in London this morning, spot tin was quoted at £231, future at £229 5s., and Straits metal at Singapore at £230.

## Lead

Buying was more active in the first half of last week, but has been lighter in the last two days. Two prices are still being quoted and the seller which is maintaining 3.50c. a lb., St. Louis, and 3.65c., New York, is reported to have booked the greater part of its intake on two or three days of the past week. Other companies continue to offer lead at prices five points below these figures, and the market is quotable at a range. Last week's buying resulted in the placing of practically all the metal required for October, and November requirements are believed to be about 50 per cent covered. September statistics will be released this week and may show a further stock reduction. In the meantime, consumption of lead this month is certainly holding its own and may be tending to increase. Battery makers are still comparatively active and paint manufacturers expect their business to improve over the remainder of the year as the result of the FHA home modernization program. Approximately 15 per cent of the loans now being made are for outside painting. The Joplin ore market remains firm.

## Zinc

Establishment of the spelter market on a basis of 3.80c. a lb., East St. Louis, and 4.15c., New York, early last week, brought some semblance of price stability, and shading is now believed to have largely disappeared. Firmer quotations also resulted in declining sales, and, while bookings early in the week were sufficient to bring the total for the period up to 3300 tons, compared with 5000 tons in the preceding week, activity in the last day or two has been very light. Demand is confined principally to October and early November metal, as consumers are buying only for their immediate needs and are not interested in forward commitments. The advance on Saturday of zinc concentrates to \$24 and \$26 respectively for the flotation and prime grades also gave the market a better tone. Shipments last week amounted to 4700 tons, compared with a production of only 1450 tons, and stocks were substantially reduced.

## Ingot Brass and Bronze

The combined August deliveries of ingot brass and bronze made by members of the Non-Ferrous Ingot Metal Institute amounted to 3757 tons. In the 28-day period ended Oct. 5, the average prices paid for commercial 80-10-10 and commercial 85-5-5-5 brass ingots were 10.106c. a lb. and 8.590c. a lb. respectively. In the previous comparable period these figures were 10.271c. and 8.759c. a lb. respectively.

## Antimony

Increased spot demand and a firmer market in China have resulted in an advance in the price of this metal to 9.50c. a lb., New York, for prompt delivery.

The Week's Prices. Cents Per Pound for Early Delivery

	Oct. 10	Oct. 11	Oct. 12	Oct. 13	Oct. 15	Oct. 16
Electrolytic copper, N. Y.*	8.75	8.75	8.75	8.75	8.75	8.75
Lake copper, N. Y.	9.12½	9.12½	9.12½	9.12½	9.12½	9.12½
Straits tin, Spot, New York	50.60	50.95			50.80	50.95
Zinc, East St. Louis	3.80	3.80	3.80	3.80	3.80	3.80
Zinc, New York	4.15	4.15	4.15	4.15	4.15	4.15
Lead, St. Louis	3.45	3.45	3.45	3.45	3.45	3.45
Lead, New York	3.60	3.60	3.60	3.60	3.60	3.60

\*Refinery quotations; price ¼c. higher delivered in Connecticut.

Aluminum, 98-99 per cent, 22.90c. a lb., delivered; new No. 12, 19.50c. a lb., delivered. Aluminum, remelt No. 12 (alloy), carload lots delivered, 14c. a lb., average for week. Nickel electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered. Antimony, 9.50c. a lb., New York. Brass ingots, 85-5-5-5, 8.25c. a lb., New York and Philadelphia.

## From New York Warehouse

### Delivered Prices, Base per Lb.

Tin, Straits pig	52.50c. to 53.50c.
Tin, bar	54.50c. to 55.50c.
Copper, Lake	10.25c. to 11.00c.
Copper, electrolytic	10.00c. to 10.50c.
Copper, castings	9.75c. to 10.75c.
*Copper sheets, hot-rolled	16.00c.
*High brass sheets	14.50c.
*Seamless brass tubes	17.00c.
*Seamless copper tubes	17.25c.
*Brass rods	13.00c.
Zinc, slabs	5.75c. to 6.75c.
Zinc sheets (No. 9), casks, 1200 lb. and over	10.25c.
Lead, American pig	4.50c. to 5.50c.
Lead, bar	5.50c. to 6.50c.
Lead, sheets	7.50c.
Antimony, Asiatic	10.00c.
Alum., virgin, 99 per cent, plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	18.00c. to 19.00c.
Solder, ½ and ½	32.00c. to 33.00c.
Babbitt metal, commercial grades	25.00c. to 60.00c.

\*These prices are also for delivery from Chicago and Cleveland warehouses.

## From Cleveland Warehouse

### Delivered Prices per Lb.

Tin, Straits pig	55.50c.
Tin, bar	57.50c.

Copper, Lake	10.00c.
Copper, electrolytic	10.00c.
Copper, castings	9.75c.
Zinc, slab	5.75c. to 6.00c.
Lead, American pig	4.75c. to 5.00c.
Lead, bar	7.75c.
Antimony, Asiatic	9.00c.
Babbitt metal, medium grade	15.50c.
Babbitt metal, high grade	59.50c.
Solder, ½ and ½	33.25c.

## Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	6.00c.	6.75c.
Copper, hvy. and wire	5.50c.	6.25c.
Copper, light and bottoms	4.62½c.	5.50c.
Brass, heavy	2.87½c.	3.50c.
Brass, light	2.50c.	3.12½c.
Hvy. machine composition	4.50c.	5.00c.
No. 1 yel. brass turnings	4.25c.	4.75c.
No. 1 red brass or compos. turnings	4.25c.	5.25c.
Lead, heavy	2.87½c.	3.37½c.
Zinc	2.25c.	3.00c.
Cast aluminum	9.62½c.	10.75c.
Sheet aluminum	11.00c.	12.50c.

## Steel Sales Improve At St. Louis

ST. LOUIS, Oct. 16.—Sales of the Granite City Steel Co. for the first half of October are in slightly greater volume than during the same period last month and close to that for the corresponding period in October, 1933. Recently there has been an upturn in demand for plates for railroad, tankage and pipe line uses. Business in galvanized sheets remains slack, the expected revival in orders from the farming trade not having materialized.

Stove plants in the St. Louis district are working at the peak of their season, endeavoring to clean up their order files and to make up for the delay occasioned by the extreme heat during July and August. Business with jobbing foundries is said to be picking up. Sales of pig iron during the week were limited to a few spot carloads.

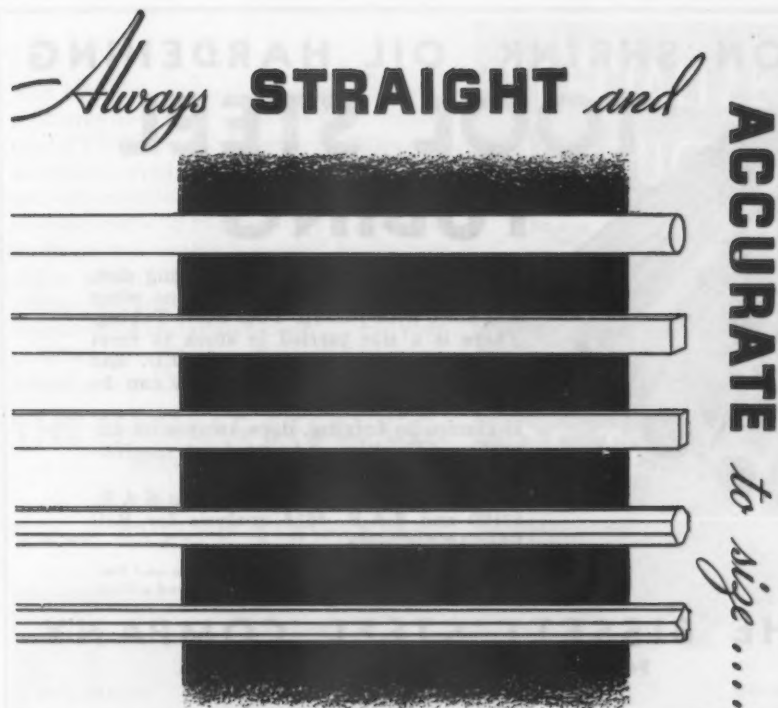
While there has been no buying of scrap and prices are unchanged, there is a feeling that the mills will come into the market within the next few weeks. Stocks in hands of dealers are said to be smaller than they have been at any time this year. Mills have not been buying, and their stocks, too, have been reduced. Railroad lists: Missouri-Kansas-Texas, 1800 tons, and Missouri Pacific, 70 carloads.

## Bids Taken at Los Angeles on Aqueduct

SAN FRANCISCO, Oct. 15.—Combined low bids received at Los Angeles by the Metropolitan Water District on the 110-mile unit of the Colorado River aqueduct total \$16,911,337. Construction under the 16 schedules of Specification No. 70 will require 16,690 to 19,500 tons of billet steel reinforcing bars, 25,500 tons of billet or rail reinforcing steel, 5800 tons of plates and 750 to 980 tons of structural steel. The major portion of the steel tonnage will be purchased by the district within 90 days after the award of general contracts.

New projects listed during the week include a subway in Los Angeles, for which 1275 tons of reinforcing bars and 100 tons of structural steel hinges are specified. New bids are being taken at Seattle on the Diablo power house and railroad bridge, which will require 450 tons of reinforcing bars and 260 tons of structural steel and sheet piling. Bids have been taken at Washington, D. C., for 1632 tons of plates and sheets for use at the Puget Sound and Mare Island Navy Yards.

Among the limited bookings was an award of 434 tons of crane rails for the power house at Boulder City,



## WYCKOFF COLD DRAWN STEEL

The smooth, clean finish of WYCKOFF Bars admirably reflects the accuracy and precision behind the manufacture of all WYCKOFF Cold Drawn Steels,—why WYCKOFF is preferred and specified by many manufacturers where machinability, tensile strength and economy are of vital importance.

### WYCKOFF DRAWN STEEL COMPANY

General Offices: First National Bank Bldg., Pittsburgh, Pa.

Mills at Ambridge, Pa. and Chicago, Ill.

Manufacturers of  
Cold Drawn Steels

Turned and Polished Shafting

Turned and Ground Shafting

### Pipe Lines

Duval Pipe Line Co., Corpus Christi, Tex., plans welded steel pipe line from Corpus Christi to oil field district at Mission, Hidalgo County, Tex., about 20 miles, with steel pipe line gathering system in field, for crude oil service. Tank farm will be constructed at main line terminus with loading racks, storage and distribution facilities. Cost over \$200,000.

Havre, Mont., plans steel pipe line system for municipal gas distribution. Bond issue of \$80,000 is being arranged.

Fulton Fuel & Light Co., Fulton, N. Y., is considering steel pipe line to Schroepfel, N. Y., and vicinity, for gas service, with smaller lines for local distribution. Proposed to carry out work early in coming year.

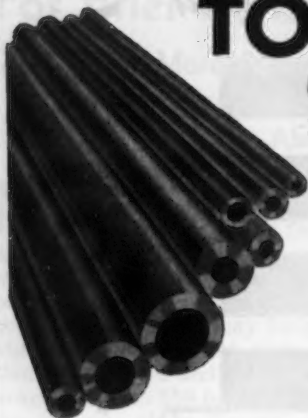
Eden, Idaho, plans about 5000 ft. 2 to 8-in. steel pipe for water supply, replacing present mains. Also plans waterworks pumping station. Financing is being arranged. S. E. Vance, Hazelton, Idaho, is consulting engineer.

Warfield Natural Gas Co., Warfield, Ky., plans welded steel pipe line from Beaver Creek district to point near Whitesburg, Ky., about 20 miles, for natural gas supply.

Tacoma, Wash., plans about 5700 ft. 48-in. and 1136 ft. 42-in. steel pipe for new Green River gravity line for trunk system water supply; also about 550 ft. 58-in. and 13,500 ft. 52-in. steel or concrete pipe. Fund of \$317,000 has been arranged through Federal aid for this and other waterworks improvements.

The Iron Age, October 18, 1934—75

## NON-SHRINK, OIL HARDENING TOOL STEEL TUBING



The job of making ring dies, cutting dies, bushings spacers, etc., is half done when you start with Bissett Tool Steel Tubing. There is a size carried in stock to meet every requirement up to 12" O.D. and 2" wall thickness. Larger sizes can be supplied.

It eliminates forging, does away with annealing difficulties and cuts down machining cost.

We also supply special tubing to S.A.E. 52100 and S.A.E. 4615 analysis for Ball Bearing purposes.

*Manufacturers of BISCO Tungsten Carbide and Tantalum Carbide drawing dies for wire, rod and tubing.*

### THE BISSETT STEEL COMPANY

945 E. 67th STREET, CLEVELAND, O.

Cincinnati

Philadelphia

### Cast Iron Pipe

Bethlehem, Pa., asked for bids Oct. 15 on 425 tons of 8 and 12-in. water pipe.

Stillwater, Pa., is asking for bids until Oct. 18 on 280 tons of 6 and 8-in. water pipe.

Oakland, Cal., has taken bids on 650 tons on which National Cast Iron Pipe Co. is low bidder.

Culbertson, Mont., has awarded 393 tons to an unnamed bidder.

Savanna, Ill., has ordered 200 tons from James B. Clow & Sons.

McLean, Ill., has placed 200 tons with James B. Clow & Sons.

Pacific, Mo., will take bids on Oct. 18 for waterworks improvements to cost \$13,000, including 10,200 ft. of 4-in. and 760 ft. 6 in. class 150 cast iron pipe.

McKinney, Tex., closes bids Oct. 22 for 4250 ft. 10-in., 4100 ft. 8-in., and 4300 ft. 6-in. for water supply. Also for turbine pumping unit and other waterworks equipment. Fund of \$30,000 has been arranged. S. J. Bross, San Saba, Tex., is consulting engineer.

Paris, Mo., asks bids until Oct. 26 for about 5700 ft. for water supply. Also for 100,000-gal. steel tank on 125 ft. steel tower. W. B. Rollins & Co., Railway Exchange Build-

ing, Kansas City, Mo., are consulting engineers.

Homedale, Idaho, plans about 7000 ft. 6 and 4-in. for water supply. Soon asks bids. Fund of \$13,820 is being arranged. Fred McConnell and L. M. Porter, Caldwell, Idaho, are consulting engineers.

Lebanon Junction, Ky., closes bids Oct. 29 for 28,100 ft. 2 to 8-in. centrifugal pipe, Class 150, for water supply system. Also for steel tank, pumping machinery and other waterworks equipment. C. N. Harrub Engineering Co., American National Bank Building, Nashville, Tenn., is consulting engineer.

Avoca, N. Y., plans pipe line system for water supply. Mayor J. W. Kennedy in charge.

Oelwein, Iowa, plans new 12-in. line for trunk water supply system. Also new steel standpipe. Cost about \$32,000.

Madison, N. C., closes bids Oct. 23 for 13,700 ft. 6-in. for water supply. Geddie Strickland, High Point, N. C., is consulting engineer.

Bradner, Ohio, plans pipe line system for water supply. Also two pumping units and accessories, and water softening plant. Fund of \$40,000 has been secured through Federal aid.

Tyrone, Ark., closes bids on or about Nov. 1 for pipe line system for water supply and other waterworks equipment. Fund of \$26,000 has been arranged. Dickinson & White, Little Rock, Ark., are consulting engineers.

Jacksonville, Ore., plans 1200 ft. 8-in. and 7300 ft. 6-in. for water supply. Alternate bids will be asked on steel pipe. E. Severance, Jacksonville, is consulting engineer.

### Railroad Equipment

Lehigh Navigation Coal Co. is inquiring for three air dump cars.

Standard Tank Car Co., subsidiary of General American Tank Car Corp., has received order for 75 tank cars and 40 individual tanks.

#### RAILS

Boulder City, Nev., 434 tons crane rails, material for use at power house, 381 tons to Stupp Brothers Bridge & Iron Works, 103 tons divided between Kansas City Steel Co. and Mississippi Valley Steel Co.

### Rule By Riot

(Concluded from Page 22)

of all fair-minded and law-abiding citizens. In the last four years the Kohler management had continued to operate its plant at a loss of more than \$4,000,000. It had filled warehouse after warehouse at great risk to its own financial integrity for one purpose and one purpose alone, i.e.: to provide work for its employees. In the face of this unselfish and enlightened policy, it was subjected to a vicious attack by unscrupulous politicians and self-seeking labor leaders of the coarsest stripe, aided and abetted by academic theorists who cannot yet distinguish between the real desires of employees and those of the self-appointed leaders who want to exploit them.

Picketing the home of the Wehr brothers, executives of the Wehr Steel Co.



## Conservatism Rules At Cincinnati

CINCINNATI, Oct. 16.—Pig Iron orders, which do not exceed 300 tons a week, reflect the desire of foundries to hold down inventories. In fact, it appears that buyers are not interested in material unless needed on signed orders. Current business is fairly well distributed among the various iron consuming industries, with the stove manufacturers just a trifle ahead of the average. Blast furnace production is unchanged, but yard stocks are not excessive. Prices are firm.

While sheet demand continues to lag at about 20 per cent of capacity, the trade reports improved feeling. Inventories are not large and in many instances, where seasonal programs have been formulated, users are beginning to see the need of early buying. Impetus given to the construction industry by the home modernization plans is contributing to the betterment of sentiment.

Warehouse bookings from industrial sources are tending upward, reversing the movement of the preceding two weeks. October business, according to present estimates, will equal, if not exceed, the September volume. Prices are steady.

Bidding on railroad scrap lists constitutes the chief activity in the old material market. The Louisville & Nashville is offering a list of about 50,000 tons, 10,000 tons of which is rails. Trading is exceptionally light and prices are uncertain.

## Pig Iron More Active At Buffalo

BUFFALO, Oct. 16.—The pig iron market has been somewhat more active. Local makers have received some fairly sizable orders from Eastern consumers. Blast furnace operations are unchanged.

No further extensive purchasing of scrap is noticeable, but the market is firm and material is comparatively scarce. This is due in some part to the recent heavy export shipments, taking material out of territory which ordinarily supplies Buffalo. One of the largest consumers is continuing to receive Lake shipments of scrap, two boats having come in during the past week. But this same consumer is not getting the scrap from the East which it used to bring in by barge canal. Some sales of No. 1 machinery cast at \$10.75 have occurred.

In finished material, it is believed that business will revive before Nov. 1, or, failing that, no real impetus may be expected before January. Steel output is unchanged, with five open-hearth in operation at the Lackawanna plant of Bethlehem Steel

The material problems of many users of cold strip have been solved by the specification of Thomastrip... Specific requirements are better served by the adequate equipment and concentrated attention of Thomas specialized cold strip production. For example, uniformity of temper is assured by the precision control of Thomas annealing and rolling operations. Special processes avoid discoloration and grain growth... Put your problems up to Thomas. You will find many advantages in Thomas service.

**THE THOMAS STEEL CO.**  
WARREN, OHIO  
*Specialized Producers of*  
**COLD ROLLED STRIP STEEL**



**THOMASTRIP**  
COLD ROLLED  
STRIP STEEL  
BRIGHT FINISH • ZINC COATED  
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**SPECIALIZED  
PRODUCTION**

*Assures*

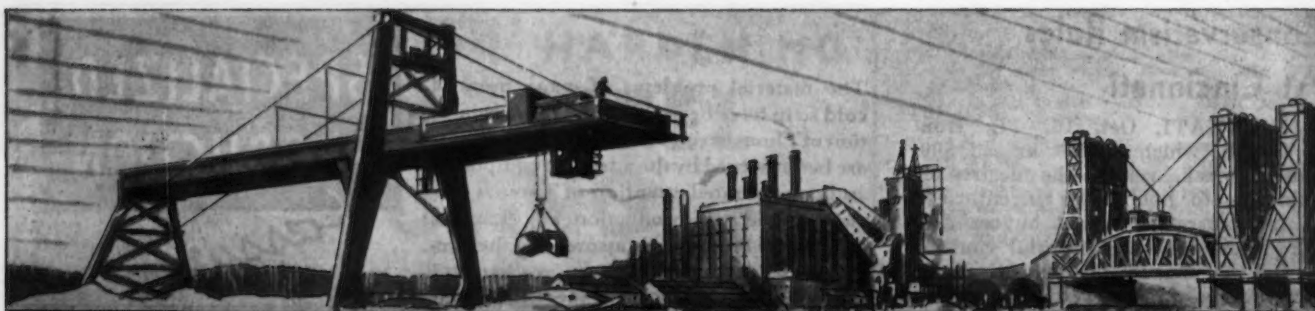
**UNIFORMITY  
OF TEMPER**

Corp., three at Republic, and one at Wickwire-Spencer. The Seneca sheet division of Bethlehem is operating at 15 per cent. A 200-ton structural job, a bridge at Yorkshire, N. Y., is reported to have been placed with a local fabricator. The Kensington high school, involving 1200 tons of structural steel and 400 tons of bars, is still going through the machinery of the PWA.

## First Steps in New York Slum Clearance

WASHINGTON, Oct. 16.—First steps to get the \$25,000,000 PWA low-cost housing and slum clearance program under way in New

York were taken last week in the exercise of options in the Williamsburg area of Brooklyn, in the neighborhood of Bushwick avenue and Grand street. Options being exercised were taken by the Municipal Housing Authority in the name of the Federal Government. Funds will be advanced out of the \$25,000,000 for payment for the land and for construction of the improvements. Harold L. Ickes, PWA administrator, said the size of the Williamsburg project is dependent upon the extent to which New York will contribute schools, streets, park area and recreational facilities to the development. Also, it was added, it will be governed by the extent to which satisfactory prices are obtained for the land.



## PLANT EXPANSION AND EQUIPMENT BUYING

### Tool Demand Expected To Revive After Election

**A**CTIVITY in machine tools continues this week at the rather restricted rate to which the industry has lately become accustomed. It is felt, or rather hoped, that some postponed buying programs will come to life after election. In the meantime orders are coming in at approximately one-half of the industry's 15 year average.

The Supervisory Agency of the Machine Tool and Forging industry reports a failure of the August pick-up to carry over into September. While the September figures are a disappointment, there is still some gain over the low summer months.

The chief event in the industry, this week and last, is the 50th Anniversary celebration of the Cincinnati Milling Machine Co. Considerably over 1000 guests visited the company's exhibits last week in Cincinnati.

#### ◀ NORTH ATLANTIC ▶

**Signal Supply Officer, Army Base, Brooklyn,** asks bids until Oct. 22 for 900,000 ft. wire (Circular 33), tubes of different types (Circular 35); until Oct. 23, 79 carriers and 60 cranks (Circular 32), electron tube rectifiers (Circular 36).

**General Foods Corp.,** 250 Park Avenue, New York, with plants at Battle Creek, Mich., Chicago, Boston and other points, plans expansion and improvements in different factories, including one at first noted place. Cost about \$300,000 with equipment.

**Goldsmith Bros. Smelting & Refining Co.,** 74 West Forty-sixth Street, New York, with headquarters at 58 East Washington Street, Chicago, has acquired property at Long Island City, 50 x 200 ft., for new gold smelting and refining plant. Cost over \$60,000 with equipment.

**Fodor New Specialties Mfg. Corp.,** New York, has been organized by Joseph L. Fodor, 322 Flax Hill Road, South Norwalk, Conn., and William H. McManus, 351 West Forty-second Street, New York, to manufacture paper fasteners, clips, staples and kindred metal products.

**Standard Oil Co. of New Jersey,** 26 Broadway, New York, has approved plans for new bulk oil storage and distributing plant at Camden, N. J. Cost over \$75,000 with tanks, pumping units and other equipment.

**Bureau of Supplies and Accounts, Navy Department, Washington,** asks bids until Oct. 23 for five hand-driven testing generators (Schedule 3541); until Oct. 26, 14 water-turbine-driven gasoline pumps and spare parts (Schedule 3507) for Brooklyn Navy Yard; until Oct. 23, eight generator sets, eight regulators and spare parts (Schedule 3468), two electric arc welding sets (Schedule 3506); until Oct. 26, motor and turbine-driven centrifugal pumps, spare parts and tools (Schedule 3481) for Brooklyn and Philadelphia yards; until Oct. 23, seven oil purifiers and spare parts (Schedule 3476); until Oct. 30, 14 fuel oil heaters, seven feed water heaters and spare parts (Schedule 3508) for Brooklyn, Philadelphia and Charleston, S. C., yards; until Oct. 23, composition sleeves, propeller and stern tube shafts (Schedule 3517) for

Brooklyn and Charleston yards; until Oct. 26, 18 ventilating sets and spare parts (Schedule 3550) for Brooklyn and Norfolk yards; non-climbable wire fencing (Schedule 3495) for New York or Philadelphia yard.

**William J. Regan, Inc.,** Utica, N. Y., has been organized by William J. Regan, 1711 Genesee Street, Utica, and Allison V. B. Regan, 831 Madison Street, Plainfield, N. J., to manufacture machinery and parts.

**Reiner & Campbell, Inc.,** 259 Lafayette Street, New York, operating a general machine shop, has leased space in building at 242-44 Lafayette Street for new works.

**Board of Education, Park Avenue and Fifty-ninth Street, New York,** plans vocational training department in new four-story and basement school at Thirty-fourth Avenue and Ninety-fourth Street, Queens Borough. Fund of \$680,000 has been secured through Federal aid. W. C. Martin, Flatbush Avenue Extension and Concord Street, Brooklyn, is architect for board.

**J. D. Curtis Corp.,** Camden, N. J., has been organized by J. D. Curtis, 404 Linden Street, and associates, to manufacture spark plugs and kindred automotive equipment.

**Board of Education, Springfield, N. J.,** plans manual training department in new multi-story regional high school. Cost about \$500,000. Financing is being arranged. F. A. Elsasser, 1000 Stuyvesant Avenue, Union, N. J., and Leslie M. Dennis, 333 North Broad Street, Elizabeth, N. J., are associated architects.

**Bureau of Yards and Docks, Navy Department, Washington,** asks bids until Oct. 31 for one 6000-kw. turbo-alternator and exciter unit, with accessory equipment, for Navy Yard, Philadelphia (Specification 7775); also for new buildings at Philadelphia Naval Aircraft Factory (Specification 7719).

**Reading School District, Eighth and Washington Streets, Reading, Pa.,** plans manual training department in new two-story and basement junior high school, for which general contract has been let to McCloskey & Co., 1620 Thompson Street, Philadelphia. Cost about \$1,000,000 with equipment. Associated Architects of Reading, 147 North Fifth Street, Reading, are architects.

**Bureau of Supplies and Accounts, Navy Department, Washington,** asks bids until Oct. 23 for one steam-operated water heater (Schedule 3523) for Philadelphia Navy Yard; 500 electric storage batteries (Schedule 3526) for Philadelphia and San Diego yards; until Oct. 26, 300 aircraft pitot-static tubes (Schedule 3512) for Philadelphia yard.

**Shepard Niles Crane & Hoist Corp.,** Montour Falls, N. Y., has concentrated all manufacturing divisions at Montour Falls. Niles plant in Philadelphia has been closed and equipment moved to Montour Falls. Erecting shop especially designed for manufacture of heavy cranes has been built. Plant formerly occupied by Cronk & Carrier Mfg. Co., which adjoins Shepard plant, has been purchased and affords additional space required by move of Niles division.

#### ◀ NEW ENGLAND ▶

**Bureau of Supplies and Accounts, Navy Department, Washington,** asks bids until Oct. 23 for nine portable air grinders for Boston Navy Yard (Schedule 3504).

**Boston Pipe & Fittings Co.,** 275 Congress Street, Boston, has leased building at 149 Sidney Street, Cambridge, Mass., for branch plant.

**School Board, Oak Bluffs, Mass., J. W. Woodward, chairman,** building commission, plans manual training equipment in new high school, for which bids will soon be asked on general contract. George E. Eldridge, Edgartown, Mass., is architect; Gordon, Robb & Edwin C. Luce, Jr., 237 Clarendon Street, Boston, are associate architects.

**Slade & Co., Inc.,** Boston, has been organized by Alfred Thomas and Erlund Field, 216 High Street, to manufacture heating equipment and devices.

**School Board, Auburn, Mass.,** plans manual training department in new multi-story high school, for which bids will soon be asked on general contract. Cost about \$260,000. L. W. Briggs, 314 Main Street, Worcester, Mass., is architect.

#### ◀ OHIO AND INDIANA ▶

**State Department of Public Welfare, State House, Columbus, Ohio, John McSweeney, director,** asks bids until Oct. 22 for 500-hp. boiler unit, stoker, and other equipment for power house addition at Ohio State Penitentiary.

**Renner Brewing Co.,** Youngstown, Ohio, has let general contract to M. DeBartolo Co., Youngstown, for addition to brewery. Cost about \$60,000 with machinery. Cook & Canfield, City Bank Building, are architects.

**Automatic Electrical Devices Co., Cincinnati,** has been organized by Clarence E. Ogden and Arthur H. Ewald, 1109 Keith Building, to manufacture electrical equipment and devices.

**City Council, East Palestine, Ohio,** plans extensions and improvements in municipal electric light and power plant, including equipment. Cost about \$30,000. Herbert Lemley, safety-service director, is in charge.

**Material Division, Air Corps, Wright Field, Dayton, Ohio,** asks bids until Oct. 22 for 105 propeller balancing stand bushings (Circular 185); until Oct. 23, 1800 square plate vibration absorbers (Circular 171); until Oct. 24, compass swinging base dolly adapter assemblies, compass swinging base dolly extension assemblies (Circular 177); until Oct.



... are easily machined when **SUNOCO** is used

**S**TEELS of high-grade physical characteristics and free machining properties are widely available. But to machine them economically, with accuracy and desired finish, these three important factors must be present:

—Modern machine tools.

—Correct tooling.

—An efficient cutting lubricant.

#### Clean and Accurate Cuts Made With Sunoco

Small tools which dull rapid'y are doubly disadvantageous: They tear the metal . . . inaccurate tolerances and faulty finishes result. Such work fails to pass inspection.

With Sunoco Emulsifying Cutting Oil, tools

make cuts that are clean and accurate. Resharp-ening and resetting are reduced to a minimum—and the percentage of work to pass inspection is increased.

#### Operators Appreciate Sunoco's Advantages

The superior lubricating and refrigerating qualities of Sunoco are acclaimed by machine operators. Experience has shown them that when Sunoco is utilized, they are assured of *continued, dependable, trouble-free machine tool performance.*

The Sun Oil Company offers the services of its Cutting Oil Engineers to help the industry in the application of Sunoco to specific metal cutting operations.

**Operation:** Cutting splines on final drive shaft.  
**Machine:** Lees Bradner 5 AC Hobber  
**Material:** SAE 3145  
**Feeds:** .050 inch  
**Speed:** 80 feet per minute  
**Lubricants:** 1 part Sunoco to 10 parts water

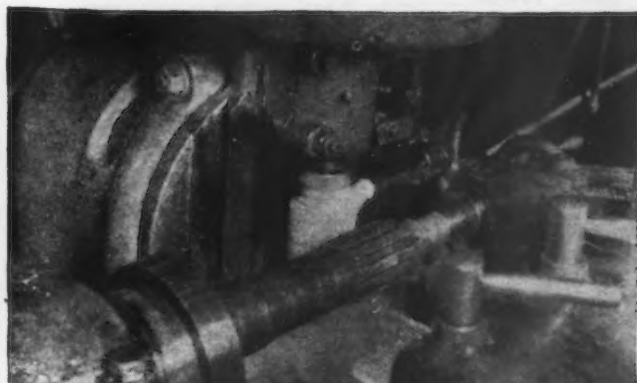
Courtesy of  
Cleveland Tractor Co.  
Cleveland

## SUNOCO

EMULSIFYING  
CUTTING OIL

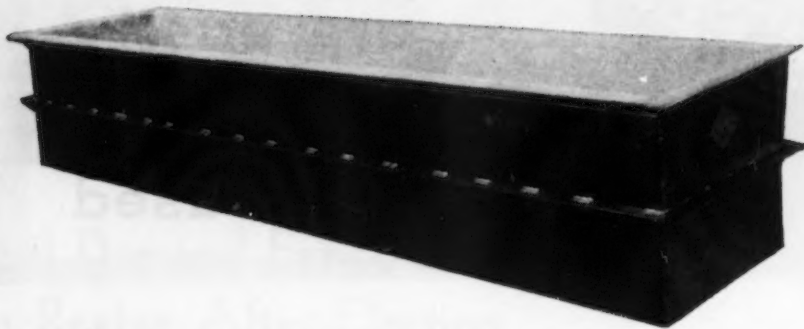
**Operation:** Finish grinding lower bearing and shoulders on track wheel shaft  
**Machine:** Norton Grinder  
**Material:** SAE 1035  
**Stock Removed:** .025 inch (.010 inch on shoulder)  
**Wheel:** 24 in. diam., 5½ in. wide  
**Wheel Speed:** 1050 f. p. m.  
**Surface Speed:** 68 ft. per min.  
**Coolant:** 1 part Sunoco to 40 parts water.

Courtesy of  
Cleveland Tractor Co.  
Cleveland



**SUN OIL COMPANY** PHILADELPHIA, PA., U. S. A. *Subsidiary • Sun Oil Co., Ltd., Montreal & Toronto*  
*Offices and Warehouses in more than 100 Cities Companies • British Sun Oil Co., Ltd., London, England*

# RUBBER-LINED-STEEL PICKLING TANKS



For batch or continuous pickling—shipped ready for use or in flanged sections to be bolted together.

With or without protective wood or brick linings, depending on operating conditions.

Write for particulars

**THE HAUSER-STANDER TANK  
COMPANY**

CINCINNATI,

OHIO

25, engine gate units, thermometer assemblies and fuel pressure gage assemblies (Circular 156); until Oct. 29, meter assemblies, drift type, in lots of 75 to 150 (Circular 162); until Oct. 30, 75 exhaust collector ring assemblies and 75 starter crankshaft support assemblies (Circular 176).

**Casting Service Corp.**, Philadelphia, Ind., has been organized by Leon W. and L. R. Turner, and S. E. Doster, Jr., 140 Franklin Court, La Porte, Ind., to manufacture iron and steel castings, forgings and kindred products.

**Well Packing Co.**, Evansville, Ind., meat packer, has let general contract to Scarborough-Thrash Co., Evansville, for addition and improvements in present plant. Cost over \$40,000 with equipment. H. Peter Henschien, 59 East Van Buren Street, Chicago, is architect and engineer.

## ◀ SOUTH ATLANTIC ▶

**Department of Public Works**, Aiken, S. C., Harry Sudlow, superintendent, plans purchase of two 100-hp. boilers, mechanical stoker, de-aerating heater and other power house equipment.

**Monarch Machine Products Co., Inc.**, Greensboro, N. C., has been organized by C. Fred Carlson and Huger S. King, Greensboro, to manufacture machine specialties and other mechanical equipment.

**Walter A. Simms**, 703 National Bank Building, Atlanta, Ga., has filed plans for one-story automobile service, repair and garage building, 80 x 125 ft., and plans purchase of three gasoline pumps, steel tanks, electric hoist air compressors, etc. Deford Smith, 113 Sixth Street, N. E., is architect.

**Town Council**, Murfreesboro, N. C., plans early call for bids for 75,000-gal. capacity elevated steel tank and tower, pipe lines, etc., for municipal water system. Spoon & Lewis, Greensboro, N. C., are consulting engineers.

**Orange State Oil Co.**, 368 N. E. Fifty-eighth Terrace, Miami, Fla., plans new bulk oil storage and distribution plant on South

River Drive, with pumping station, five 20,000-gal. capacity elevated steel tanks and other equipment. Cost over \$65,000 with equipment. Harry N. Glover, address noted, is company engineer; M. M. Vaviloff, 2139 S. W. Twenty-fifth Street, is architect.

## ◀ SOUTHWEST ▶

**United States Engineer Office**, Manufacturers' Exchange Building, Kansas City, Mo., asks bids until Oct. 23 for two electric welders, cable, wire-cleaning brushes, hand shields, helmets, etc. (Circular 222).

**City Council**, Pawnee, Okla., W. C. Williams, city clerk, asks bids until Oct. 24 for two 450-hp. Diesel engine-generating units, with exciters and complete auxiliaries, oil storage tank, piping, switchboard, instruments and accessory equipment for municipal electric light and power plant. W. R. Holway, 302 East Eighteenth Street, Tulsa, Okla., is consulting engineer; O. F. Sewell, Pawnee, is city engineer.

**Witt Oil & Gas Co.**, Estancia (Torrence County), N. M., plans addition to local carbon dioxide plant, doubling present output. Cost close to \$50,000 with equipment.

**City Council**, Mansfield, Ark., plans installation of pumping machinery, pipe lines, etc., for new municipal waterworks. Fund of \$56,000 has been arranged. W. L. Winters, Merchants' National Bank Building, Fort Smith, Ark., is consulting engineer.

**Board of Education**, Library Building, Kansas City, Mo., plans manual training department in new three-story and basement Lincoln high school, for which bids will be asked on general contract before close of month. Cost about \$700,000. Charles A. Smith, Finance Building, is architect; Nate W. Downes, last noted address, is mechanical engineer.

**Common Council**, Naples, Tex., asks bids until Oct. 31 for motor-driven deep-well pumping machinery and accessories, 50,000-gal. elevated steel tank and tower, pipe lines, etc., for municipal waterworks. Fund of \$45,300 has been arranged. H. R. F. Heland,

Frost National Bank Building, San Antonio, Tex., is consulting engineer.

**City Council**, Fairfield, Tex., asks bids until Oct. 30 for deep-well motor-driven pumping machinery and accessories, 100,000-gal. elevated steel tank on 100-ft. steel tower, 100,000-gal. steel surface reservoir (alternate bids on concrete reservoir), pipe lines, fittings, etc., for municipal water system. Harvey B. McAlister, 914 Washington Street, Waco, Tex., is consulting engineer.

## ◀ BUFFALO DISTRICT ▶

**Canadian Wineries, Ltd.**, Stamford, Ont., is completing new branch plant at Lewiston, N. Y., and will install new equipment. Cost over \$100,000 with machinery. At early date, company plans new multi-story unit on adjoining site for storage and distribution. Cost about \$125,000 with equipment.

**Sectional Heater & Engineering Corp.**, Buffalo, has been organized, capital \$100,000, by Silas C. Wead, 119 Christian Street, Tonawanda, N. Y., and Edward Oldman, 158 Huntington Avenue, Buffalo, to manufacture heating equipment and devices.

**Wahl Iron Works**, New Liskeard, Ont., manufacturer of iron castings, etc., plans new one-story foundry, 60 x 75 ft., with extension, 30 x 55 ft. Cost over \$40,000 with equipment. H. B. Long, Whitewood Avenue, is architect.

**Board of Education**, Hammondsport, N. Y., plans manual training equipment in new high school. Cost over \$175,000. R. R. Graham, 25 Prospect Street, Middletown, N. Y., is architect.

## ◀ SOUTH CENTRAL ▶

**Kentucky Blue Grass Distilling Co.**, Louisville, recently organized by F. F. Curtis, W. L. McComas, Louisville, and associates, has taken over property at Fisherville, Ky., and plans erection of new distillery. Power house also will be built. Cost over \$85,000 with equipment.

**Board of Trustees**, Lebanon Junction, Ky., will receive bids until Oct. 29 for two motor-driven high-lift pumping units and two low-lift pumps, accessories, 75,000-gal. elevated steel tank and tower (alternate bid on 100,000-gal. steel tank or concrete reservoir), pipe, pipe fittings, etc., for municipal waterworks. C. N. Harrub Engineering Co., American National Bank Building, Nashville, Tenn., is consulting engineer.

**Campbellsville Cooperage Co.**, Campbellsville, Ky., recently organized by N. E. Chandler and H. T. Parrott, Campbellsville, plans new one-story plant, 50 x 150 ft., for manufacture of wirebound barrels, kegs, etc. Cost close to \$40,000 with machinery. Mr. Parrott will be president.

**Sinclair Refining Co.**, 45 Nassau Street, New York, has plans for new bulk oil storage and distribution plant at Maryville, Tenn., with steel tanks, pumping plant, etc. Cost about \$45,000 with equipment.

## ◀ WASHINGTON DISTRICT ▶

**Board of District Commissioners**, District Building, Washington, asks bids until Oct. 22 for one 750-gal. capacity pumping engine, and two combination hose wagons; also metal stairway for district workhouse.

**United States Industrial Alcohol Co.**, Curtis Bay, Baltimore, has awarded general contract to Barney-Ahlers Construction Corp., 110 West Fortieth Street, New York, for extensions and improvements in plant, including new power house. Cost over \$100,000 with equipment. Headquarters are at 60 East Forty-second Street, New York.

**General Purchasing Officer**, Panama Canal, Washington, asks bids until Oct. 24 for cast iron shaft street lamp posts, 50,000 ft. soft drawn copper wire, 60,000 ft. copper wire, 140,000 ft. solid copper wire, 50,000 ft. extra flexible rubber insulated cord, 5000 ft. rubber insulated cable, stranded copper cable, malleable iron pipe fittings, brass or bronze pipe fittings, 21 distribution type transformers, toggle switches, electric lighting fixtures, valves, cocks and other supplies (Schedule 3001).

**Chevrolet Motor Co.**, 3044 West Grand Boulevard, Detroit, has let general contract to Consolidated Engineering Co., 20 East Franklin Street, Baltimore, for main buildings

# The interest you take in Goggles

pays dividends  
in Dollars



Courtesy Caterpillar  
Tractor Co.



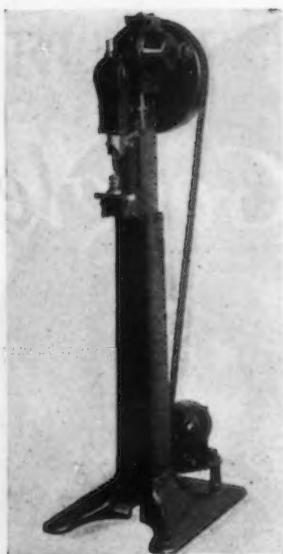
This Duralite "50" Goggle offers sure, comfortable eye protection for men employed in grinding, sanding, chipping, stamping, and other similar jobs. Super Armorplate lenses provide greater resistance to impact than any other standard lens.

Well planned eye safety programs have effected very sizable savings for many companies and increased their advantage in competitive selling. An eye safety program in one large plant, reported by the National Safety Council, had saved 122 eyes over a seven-year period, as well as about \$250,000 in compensation and medical expenses. Goggles had eliminated eye injuries altogether in the twelve months preceding the study. Another metal working plant progressively reduced its average annual eye accident costs from nearly \$2,000 to \$88 and finally to \$10.

American Optical Company offers a complete line of goggles for every kind of eye hazard . . . equipment that exactly fits the needs of the man and his job . . . goggles that are strong, cool, comfortable and allow full vision. Trained industrial representatives located in AO branch offices in every principal industrial center are ready to work with you in making your eye safety program more effective and your profit more secure.

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Manufacturers, for more than 100 years, of products to aid and preserve vision. Factories at Southbridge, Mass. Branch offices in all principal industrial centers. In Canada, Consolidated Optical Co., Ltd., Toronto.



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## THE "RIVITOR"

A machine that automatically feeds and sets solid rivets with as much speed as tubular rivets and a 10% to 19% gain in the strength of the joint accomplished.

### THE DUPLEX—

Punches—then feeds and sets rivets.

### THE SIMPLEX—

Feeds and sets rivets in holes punched in previous operations.

### THE CLINCH NUT MACHINE—

Feeds and sets clinch nuts.

Let Us Submit Samples Of Your Work  
Done In The "RIVITOR" Method

## THE TOMKINS-JOHNSON COMPANY

628 N. Mechanic Street, Jackson, Michigan

of new branch assembling plant in Canton industrial district, including one and one-half story shop, 600 x 980 ft., power plant and other structures. Cost over \$700,000 with equipment. Albert Kahn, Inc., Detroit, is architect and engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Oct. 23 for 100 propane gas cylinders and 40 connecting assemblies for Sewall's Point, Va., Navy Yard (Schedule 3530); one polishing or mixing machine and one pelleting machine for Washington yard (Schedule 3516); until Oct. 30, 145 motor-generator sets and spare parts, L.o.b. works (Schedule 3509).

### ◀ WESTERN PENNA. ▶

Henry's Bend Community Association, Henry's Bend, Pa., care of P. C. Stubler, 23 Elm Street, Oil City, Pa., president, plans electric light and power plant, with transmission and distribution lines for service throughout district. Cost over \$60,000 with equipment.

Hazel-Atlas Glass Co., Wheeling, W. Va., has asked bids on general contract for addition to plant. Cost over \$100,000 with machinery. Frederick Faris, 1117 Chapline Street, is architect.

National Armature & Electrical Works, Bluefield, W. Va., has construction nearing completion on new plant at Columbus, Ohio, where operations will be concentrated, and plans early removal of Bluefield plant to that location. Cost about \$40,000 with equipment. R. R. Royce, 2176 North Parkway, Columbus, is architect for new works.

### ◀ MICHIGAN DISTRICT ▶

Bower Roller Bearing Co., 3040 Hart Street, Detroit, has plans for one-story addition. Cost over \$25,000 with equipment. Albert Kahn, Inc., New Center Building, is architect and engineer.

Superior Welding & Brazing Co., 6564 Russell Street, Detroit, has let general contract to Weatherhead Co., Fisher Building, for one-story addition.

Excello Die Casting Co., Grand Rapids, Mich., has been organized by Edward J. Hultman, 1140 Monroe Avenue, N. W., and associates, to manufacture die castings and kindred specialties.

Berrien Brewing Co., Benton Harbor, Mich., recently chartered with capital of \$150,000, has taken over local factory of Spencer-Barnes

Furniture Co., and will remodel for new brewery. Cost over \$85,000 with equipment. George F. Racine is president and George C. Bridgman, vice-president.

Bohn Aluminum & Brass Corp., 2512 East Grand Boulevard, Detroit, is organizing a subsidiary to erect a plant for production of new sheet and wire aluminum products. An existing building at present works will be equipped for an experimental and pilot plant, to cost about \$60,000. Following a new plant will be built to operate under special process. Cost over \$5,000,000 with equipment. Charles B. Bohn is president.

### ◀ MIDDLE WEST ▶

Signal Corps Procurement District, 1819 West Pershing Road, Chicago, asks bids until Oct. 23 for 10 gasoline motor-driven reel units for laying and recovering field wire (Circular 16); 10,000 galvanized bridge rings, 9000 clamps and 18,500 insulators (Circular 19).

National Aluminum Mfg. Co., 2700 North Adams Street, Peoria, Ill., has been organized under direction of Howard D. Moses, 231 South La Salle Street, Chicago, to manufacture aluminum products.

Home Gas & Electric Co., Greeley, Colo., plans new transmission line from Greeley to Ault and Peckham, Colo., about 22 miles. Cost about \$65,000 with equipment.

Rath Packing Co., Waterloo, Iowa, meat packer, has plans for one-story addition. Cost over \$25,000 with equipment. H. Peter Henschel, 59 East Van Buren Street, Chicago, is architect and engineer.

Theodore Hamm Brewing Co., 681 East Minnehaha Street, St. Paul, Minn., has let general contract to William Baumeister Construction Co., Pioneer Building, for three-story malt house, 100 x 125 ft. Cost over \$100,000 with machinery. C. H. Johnston, 360 Robert Street, is associate architect.

Hiram Walker & Sons, Peoria, Ill., distillers, have plans for three-story and basement evaporator unit, 65 x 70 ft. Cost over \$70,000 with machinery. Smith, Hinchman & Grylls, Marquette Building, Detroit, are architects and engineers.

C. R. Erickson, State commissioner of purchases, State Capitol Building, St. Paul, Minn., asks bids until Oct. 22 for one-story addition to foundry at State prison, Stillwater, Minn., 28 x 180 ft. Cost about \$30,000 with equipment. Charles A. Hausler, Minnesota Building, St. Paul, is architect.

Yates-American Machine Co., Beloit, Wis., manufacturer of wood-working machinery has established a new division for production of

a full line of heat transfer units, including unit heaters, automotive radiators, automobile heaters, etc. Manufacture of wood-working tools will be continued. Roger Birdsell, formerly of Perfex Corp., Milwaukee, has been appointed manager of new division.

Hermanson-Nortman Co., Milwaukee, has been incorporated by Sune Hermanson, 2189 North Fifty-second Street; Arthur Davidson and Walter Nortman, to engage in treating metals. A shop is being equipped at 401 South Seventh Street. Pickling equipment has been purchased.

### ◀ PACIFIC COAST ▶

Pacific Can Co., 290 Division Street, San Francisco, plans early erection of new plant on 20-acre tract at Stockton, Cal. Cost over \$100,000 with equipment. Ellison & Russell, Pacific Building, San Francisco, are engineers.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Oct. 30 for one gage testing machine (Schedule 3521); vacuum tubes (Schedule 3489) for Mare Island Navy Yard; 27 combined CO<sub>2</sub> indicators and recorders (Schedule 3493) for San Pedro and Puget Sound yards.

Metropolitan Water District, 386 West Third Street, Los Angeles, F. E. Weymouth, chief engineer and general manager, asks bids until Oct. 22 for 33,000-volt transformers (Specification No. 78).

Golden West Brewing Co., 533 Kirkham Street, Oakland, Cal., has plans for one-story addition. Cost about \$40,000 with equipment. W. Adrian, 417 Market Street, San Francisco, is consulting engineer.

Jessen Automotive Co., Los Angeles, has been organized by Ralph E. Sperry and M. E. McNeley, care of George Nilsson, 555 South Flower Street, representative, to manufacture automobile equipment, parts, etc.

Bureau of Reclamation, Denver, asks bids until Nov. 1 for 10 centrifugal type mechanical fan units, capacity 7000 to 20,000 cu. ft. per min.; five propeller type mechanical fan units, 5000, 12,000 and 20,000 cu. ft. capacity per min.; five surface coolers; six sets surface cooler coils; 10 combination surface cooler and heater units, floor and wall type; seven combination surface cooler and heater units, cabinet floor type; air flow control equipment for ventilating and air cooling system, and complete accessories, for Boulder power plant, Boulder Canyon project, California-Arizona (Specification 630-D).

Mohawk Oil Co., 405 Montgomery Street, San Francisco, has let general contract to E. J. Freethy, 1301 Roosevelt Avenue, Richmond, Cal., for new bulk oil storage and distributing plant in outer harbor district, Richmond, with steel tanks, pumping station, etc. Cost close to \$50,000 with equipment.

City Council, Bountiful, Utah, plans new municipal electric light and power plant, with purchase of local electrical distribution system of Bountiful Light & Power Co., and extensions and improvements in such power lines. A bond issue of \$156,000 has been sold. Power plant will be of Diesel engine-generator type.

### ◀ FOREIGN ▶

New South Wales Department of Public Works, Sydney, Australia, asks bids until Dec. 3 for two turbo-generator sets, each 5000-kw. capacity, with accessories, switchgear and other hydroelectric power equipment for generating station at Burrunguck.

National Coke & Oil Co., Cannock, England, operating under special process, plans early construction of branch plants at Trafford Park, Manchester, and Glasgow, Scotland. Cost over \$200,000 with retorts and other equipment. Financing is being arranged through new stock issue.

Department of Public Works, Hamilton, Bermuda, plans new airport between city and Government naval base, primarily for sea-planes, including hangars, repair and reconditioning shops, oil storage and distributing building and other structures. Fund of \$75,000 is being arranged by Legislature.

Ministry of Public Works, Montevideo, Uruguay, plans call for bids early next year for equipment for new Federal hydroelectric generating plant on Rio Negro, including transmission lines, with power substations and switching stations. Cost over \$1,250,000.

ADVERTISEMENT—Each item on this page is a paid advertisement

# POWER TRANSMISSION NEWS

One of the few things which a giant ore unloader on a Great Lakes steamer and a motion picture projector have in common is an application of a Morse Silent Chain Drive.

The accompanying picture illustrates the wide range of Morse Silent Chain Drives, from  $\frac{1}{8}$ " pitch, shown here with a link from a 3" pitch by way of comparison.

The  $\frac{1}{8}$ " pitch is widely used in units applying fractional horsepower, such as adding machines, motion picture projectors, sewing machines and other small devices.

The fact that these drives range all the way up to 3" pitch for the heaviest service

vibration and chain whip—guards against loss of side plates and chain breakage. Easy to insert, just push in place—the twist holds it tight.

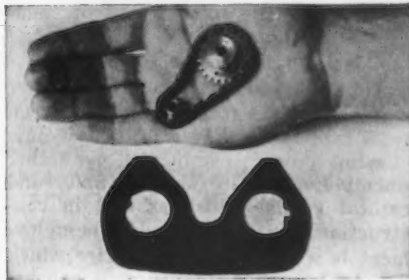
Morse Silent Chains have an enviable record in the automotive industry as standard equipment. Several million cars are equipped with Morse Chains for timing gear drives, thus insuring silent, positive, carefree operation.

Thirteen years consistent use of Morse Chain Drives in a 4-million bushel capacity elevator, enables the mechanical super-

intendent to judge their value. "We find," he reports, "that Morse chains withstand better than any other type of drive the extremely damaging effects of the ever-present dust and grit."

Six Morse drives serve a variety of purposes in this elevator and Morse chains, ranging from  $7\frac{1}{2}$  to 100 horsepower, are used in other elevators operated by the company.

"Because they operate without slippage and at full efficiency," he concludes, "Morse chains are ideal for elevator service where space is always at a premium."



indicates not only the extensive line of chain drives available for power transmission, manufactured by the Morse Chain Company, Ithaca, New York, but the universal appreciation of the economy and dependability of these units in a multitude of commercial and industrial applications.

## 200 Drives in One Plant

Apart from their definite economies of operation and savings in maintenance, Morse Chain Drives provide other advantages which we find are of considerable interest to engineers and production men.

Discussing the Morse Drives about 200 of them in his plant, one superintendent says: "The short centers permitted by chain drives save production space, and the absence of line shafting improves light and operating conditions. The chains are encased, eliminating one important accident hazard and their long life is unequalled by anything else we have ever used."



## Spring Lock Pins a Feature of Morse Roller Chains

Recommended in place of cotter pins—will not shake loose, but are easily removed. Note the twist in the pin—it exerts a powerful holding influence against

## Chain Drives

### FOR STEADY, POSITIVE OPERATION

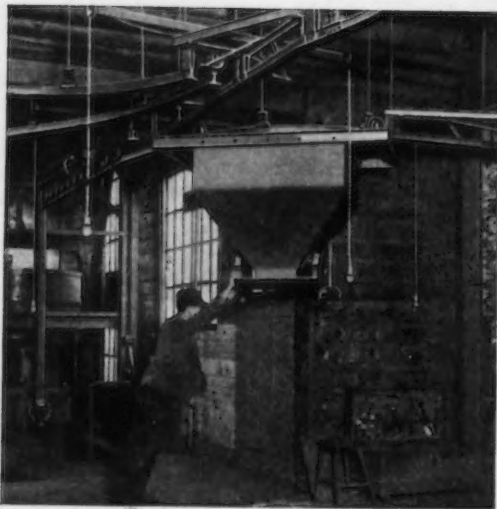
• Chain drives transfer power continuously, conserve power, increase output and reduce power and transmission costs. • Full engineering data is available on request, explaining this flexible, positive, low-cost method of power transmission. There is a Morse Drive scientifically engineered to meet your power transmission problem, large or small.

## MORSE CHAIN COMPANY

A Division of Borg-Warner Corporation

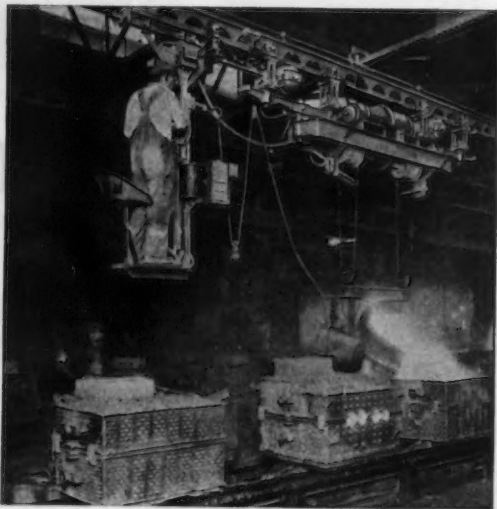
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Overhead Materials  
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DIVISION OF  
**THE CLEVELAND CRANE & ENGINEERING CO.**  
WICKLIFFE, OHIO

## Industry's Part in Social Progress

*(Continued from Page 48C)*

industry (not in speculation) which will find their way more surely than in the past into consuming power for the man of the population.

### Profit Rate Fluctuates Around 4 Per Cent

But perhaps there are big profits not paid out in dividends or bonuses, but "ploughed in" to the business. The answer to this is given in a chart of total profits of American corporations as reported by the Federal authorities for the years 1919 to 1932 inclusive. As reckoned on the gross income, the rate of profit for the good years fluctuates around 4 per cent. In poor years it is promptly reduced, and in bad ones it is converted into a serious net loss.

Colonel Ayres' discussions of taxation and inflation are interesting, but not directly pertinent to our topic.

The diagram for purchasing power emphasizes what has already been said, that the greatest failure of purchasing power lies in the persisting unemployment in the durable and capital goods industries and in construction. In other words, unemployment is worst in the industries which depend for their activity on a general revival of profit.

All of this clinches the argument. There is in productive business no inexhaustible fund of profit which may freely be drawn upon at any given moment to raise wages and supply new and expensive (and needed) social safeguards. There has been no serious maldistribution of income in productive business—at least nothing remotely capable of responsibility for the great catastrophes with which it has been charged. The difficulties lie elsewhere. And finally it becomes more and more clear that the solid road for our bogged industrial machine is the old and safe one of revived profits. That way lies re-employment, and that way lies a continuation of our old progress to even higher standards of living.

### Evidences of a Change In the Wind

What, then, shall we do? We have been discouraged and thwarted by the policies which have been proposed, accepted and acted upon by government, by labor and by some sections of industry itself. These policies, based upon fallacies, have hitherto prevented the attainment of the reasonable hopes of our people as a whole.

So has it been up until this moment. But there are clear evidences of a change in the wind.

As to labor, the short-sightedness of its leadership is becoming evident

*(Continued on Page 86)*

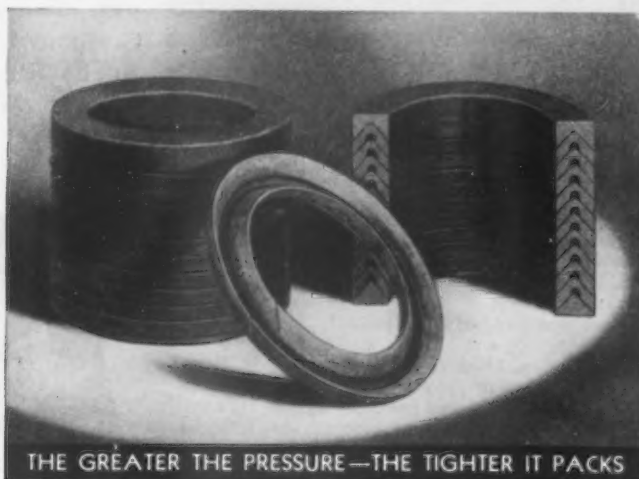


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**PACKING**



THE GREATER THE PRESSURE—THE TIGHTER IT PACKS

Its unique and original design is responsible for the automatic action of Garlock Chevron Packing—a packing manufactured only by The Garlock Packing Company.

At high pressures or low pressures Garlock Chevron forms a perfect pressure seal. On the return stroke it automatically eases off, practically eliminating friction.

Its use saves power . . . and money . . . for its long life is in direct contrast to its moderate cost.

For rods or plungers operating against steam, air, gas, water or liquids Garlock Chevron is a superior packing.

Use Garlock Chevron . . . and save power losses.



THE GARLOCK PACKING COMPANY, PALMYRA, NEW YORK

In Canada: The Garlock Packing Company of Canada, Limited, Montreal, Quebec

**G A R L O C K**

# NEW FLUID POWER FEEDS

100 to 600% More  
Rapid Traverse Speed

Up to 50% Lower Cost

## Compensated

For Speed Variations Under Temperature and Working Conditions

Get Oilgear's  
Big New Book.  
Free, of Course

● Above: The Foster Fastermatic No. F-4, Oilgear Fluid Power Feed equipped. Makes three parts per hour—best previous time was five per day.

● At Right: A new Oilgear Fluid Power Feed. Note: Flanged mounting, as integral machine part . . . Inside pump eliminating hazard and bettering appearance . . . Self-contained; auxiliary valves, tubing, etc. are integral with pump . . . Many other exclusive features.

Builders and buyers hail these vastly improved machines as the way to step up sales and step down costs. The big new Oilgear Booklet gives all the facts—have you asked for yours yet? The Oilgear Company, 1311 West Bruce Street, Milwaukee, Wisconsin

## OILGEAR FLUID POWER FEEDS

(B-1392)

(Continued from Page 84)

to all. The mass of workers will not long remain content with the only fruit which traditional union policy offers—apples of Sodom, fair to the eye, but devoid of nourishment, and with no taste on the tongue but that of the bitter ashes with which they are filled.

Industry is learning its lesson. There were apples of Sodom even in the NRA fruit basket. They do not satisfy, and more realistic policies are being sought.

As to government, the outlook is better than it has been at any time in

the recent past. Faith in fallacies is waning. While the hope of recovery by combined bleeding and forcible feeding still persists, the administration—including the President himself—appears to be in a more receptive mood for permitting industry to tackle the job in its own natural way. Have we enough strength and courage left to meet and match our opportunity?

The effective way is the old way. We have just passed through a minor cycle of temporary depression in what may be, and must be made, the major curve of recovery. The worst is now behind us. Here and there, in slowly

increasing quantities, will be found industrial companies and groups whose current operations are satisfactory, and who would be willing, under ordinary circumstances, to venture into a little larger scale of operations. Let these firms do so. Let them run the risk, smaller now than in any recent time, of an assault on their constructive efforts by government or by labor. Let them, and industry in general, continuously educate themselves, government and labor to the end that these suicidal assaults may be warded off.

Such moderate, judicious, but widespread expansion of business enterprise is the stuff of which a safe recovery, a solid prosperity, is made. Nothing can take its place—not "priming the pump," or forced injections of credit into specific enterprises, however worthy. The safe expansion of credit, of employment and of purchasing power comes from a natural, unforced expansion of this type, made in the reasonable hope of expanded profits.

And these profits from the normal operations of production and distribution of goods and services, even though they rise to high percentage in many individual instances, will not lead to maldistribution of wealth or to serious fluctuations in business. Profits of this sort flow steadily into the markets for durable and capital goods and into the expansion of personal and social services. On the expansion of these profits depend our only solid hopes for large scale re-employment. We have no other hopes. We know of no other way.

On these profits, finally, depend the initiation and maintenance of those social services by which we hope to safeguard the worker from anxiety and want. There is no other source of support.

We are helping our good friends, the Cincinnati Milling Machine Co., to celebrate their fiftieth anniversary. They have shown us a panorama of their past—the impressive and affecting history of the years of small things, the period of growth, and the attainment of maturity with its fullness of achievement and honor.

They have shown us also the new developments—ingenious mechanisms which carry on and advance into a new age the traditions of their first half a century. There must have been many doubts and many pauses for consideration in this continuance of progress, in the face of discouraged business and militant social fallacy. But they did not stop, they pushed straight on.

This spirit and this policy is the hope of the future. On them will be built the solid structure of our social progress—a better and safer living for the ordinary man, and the satisfactions of worthy achievement for ourselves.

Let us go and do likewise.

# Flat head cap screws of real accuracy



**D**O what this man did. Take a double handful of Cleveland Cap Screws out of the keg or package that's shipped you and examine these fine cap screws for imperfections. Threads are sharp, complete to the point—and the point is smooth. Our flat head cap screws have clean, sharp slots, milled carefully. Full finished. A cap screw you can be proud to use in your

assemblies. The Kaufman Process, *patented*, our own plant development, insures a better cap screw at the current market price.

●  
**THE CLEVELAND CAP SCREW COMPANY**  
2930 E. 79th St., Cleveland, Ohio

*Address Our Nearest Warehouse:*  
CHICAGO, 726 W. Washington Blvd.  
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**C L E V E L A N D   C A P   S C R E W S**

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SAVE machine-hours in your fabricating operations by using steel more closely dimensioned for your purpose.

Many such opportunities for economy are found in B & L Extra Wide Flats.

With these cold drawn sections you can simplify the manufacture of machinery and equipment requiring parts of unusual breadth, smoothness and accuracy.

They come in standard widths of 8", 10" and 12" in any thickness from  $\frac{1}{4}$ " to 2", cold sawed to length, not sheared. You will find them easy to work into stripper plates, bed plates, die backing plates and similar parts.

True in size and section, uniform in flatness and straightness, Extra Wide Flats give you the extra precision you need for quality production.

These handy sections may suggest savings in your plant—inquiries are invited.



- Cold Drawn Bars and Shafting
- Free-Cutting Screw Stock
- Extra Wide Flats
- Special Sections
- Alloy Steels

## BLISS & LAUGHLIN, INC.

HARVEY, ILL. Sales Offices in all Principal Cities BUFFALO, N.Y.

### Wire Association Discusses Annealing

(Concluded from Page 29)

tially controllable in the present state of the art. Its recognition as a means of classifying steels and its ultimate control are recognized as of great and growing importance in wire manufacture.

A paper by H. G. Hobbs entitled "Lime Coating Versus?" summarized what fragmentary knowledge exists regarding the use of lime coating ve-

hicles for dry drawing, particularly tri-sodium phosphate and sodium silicate. The discussion, if it did not bring out anything new, served to disseminate the bits of experience held here and there among the members. The consensus was that in the face of the cheapness and effectiveness of lime, the extremely low cost of lime consumed per ton of wire, and the fact that a fair trial of its substitutes would probably involve new technique and new equipment, that the substitutes stood a rather thin chance in the immediate future. It seemed from the discussion and side remarks

that multi-draft work was rather uncertain and that the bright finish was secured at an appreciable cost in die wear.

In the sessions devoted to non-ferrous wires, papers were presented on smelting, casting and rolling of electrolytic copper by W. S. Adams and R. H. Miller, lubrication for copper wire by John G. Richards and Canadian copper by D. Horsfall. The discussions were directed by Paul Fast and M. A. Kent, and, in a joint session with the Braiding and Wire Covering Machinery Association, by H. W. Anderson. In this joint session there were papers by S. B. Blaisdell on braiding, by Robert W. Withington on enameling and winding, and by R. V. Olsen on high-speed carrier developments.

A lively discussion developed regarding the exact value of speed in drawing and fabricating operations, stimulated by an anonymous communication read by the chairman under the title "What Price Speed?" This discussion not only flared up throughout all the sessions but smoldered along the floor from time to time in the form of remarks that did not get onto record.

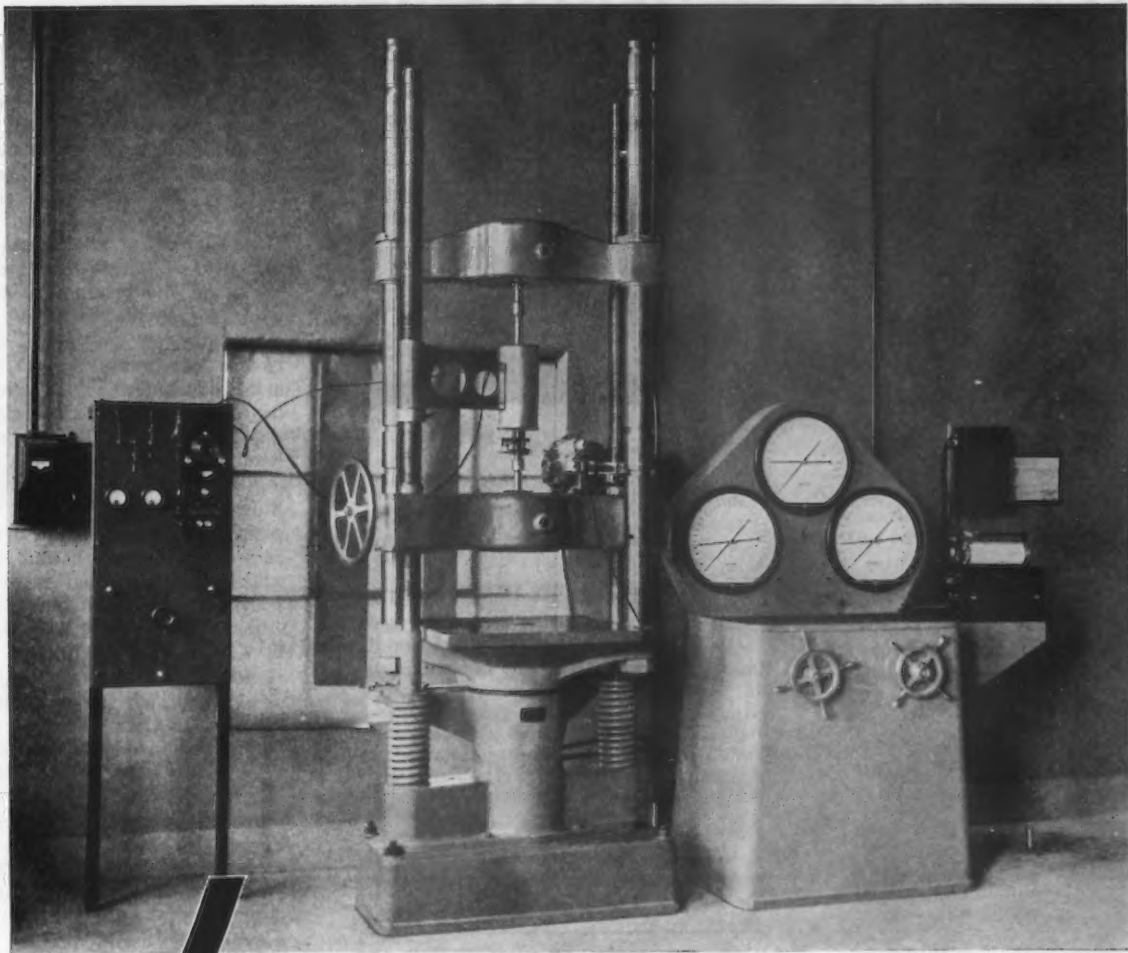
Mr. Horsfall's paper was presented in his absence by Mr. Titus, who commented on the future of Canada's copper industry. Due to the fact that her copper ores are for the most part economically workable for their silver and gold contents alone, here copper costs are largely a matter of book-keeping, and the future of the industry looks bright.

Tinning operations were reviewed in some length. Interesting comparisons developed as to the similarity between steel mill and copper mill practice. This is one of the very few operations common to both branches of the industry and fairly comparable.

The technical discussions on the whole were better attended than in previous years, better controlled, held closer to topics and, consequently, went deeper. It was the opinion of the members attending that their value will continue to increase. President Mordica in addressing the annual business meeting noted with a good deal of satisfaction that the association, founded in the depression, has steadily gained in membership, in the character of its activities, and in its financial position.

A feature of the business meeting was the presentation to E. J. P. Fisher, Keystone Steel & Wire Co., Peoria, Ill., of the Wire Association Medal, a bronze plaque, for his paper on spring wire. The committee of judges chose his paper as the most meritorious submitted this year. This was the first award of this medal.

A long-distance record for coming to the meeting was set up by Paul L. Deutz, of Compania Nacional de Claves, who drove from Mexico City to attend the meeting.



# Leadership ..

One of the essential qualities of leadership is versatility.

When Walworth Company, New York, famous for quality valves, fittings and tools, wanted not only the best in testing machines for their new laboratory at Greensburg, Pa., but also a high temperature furnace and means for the production of stress strain curves from metals at these temperatures—they turned to Southwark.

The illustration shows a standard three-gage Southwark-Emery testing machine with Southwark-Emery recorder, high temperature furnace, high temperature extensometer and Selsyn motor drive from extensometer to recorder. Furnace control is shown on panel at left. The unit to the right above the recorder furnishes direct current for the latter.

Whatever your problems in materials testing, bring them to Southwark. We may have had experience directly bearing on their solution.



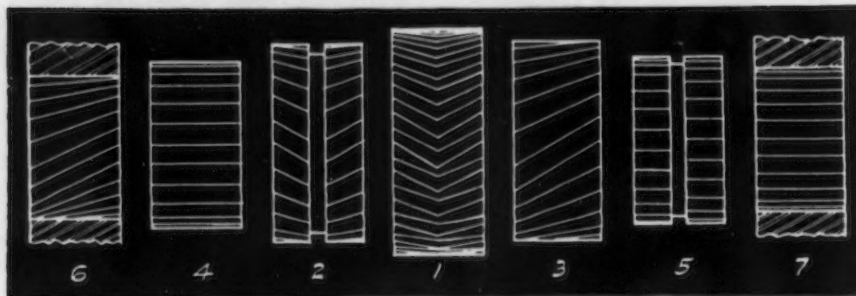
**BALDWIN-SOUTHWARK CORP.**

**SOUTHWARK DIVISION : PHILADELPHIA**

Pacific Coast Representatives: The Pelton Water Wheel Co.  
San Francisco

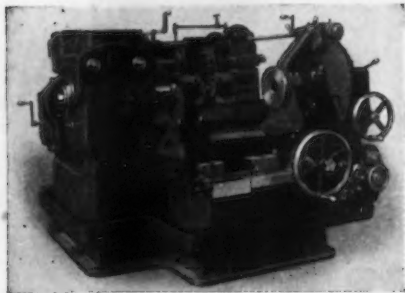
# SYKES GEAR GENERATORS

## cut all these types



The versatility of Sykes Gear Generators is graphically portrayed by the drawings on this page showing the variety of gears that can be cut in a single machine with standard equipment and standard cutters:

1. Sykes double helical continuous tooth
2. Double helical with a gap—teeth matched or staggered
3. Single helical, external
4. Spur, external
5. Spur, staggered teeth
6. Single helical, internal
7. Spur, internal



Size 2-B Sykes Gear Generator. Capacity:  $\frac{1}{2}$ " to 25" dia.;  $\frac{1}{2}$ " to 8" face; 24 to 3 D.P.; 800 cutting strokes per minute.

In addition, they will cut:

8. Straight or helical spline shafts
9. Cluster gears
10. Sprocket wheels
11. Reamers
12. Cams
13. A variety of special contours

They will do this wide range of work with greater speed, accuracy and economy than can be attained by any other method. If you are interested in the economical production of accurate gears or other toothed forms we shall be glad to supply you with full engineering data or to demonstrate by actual performance what the Sykes machines will do.

Just drop us a line to the address below, mentioning the size machine which will cover your requirements as indicated by the following table of capacities:

Size No.	Diameter		Face Width		Diam. Pitch	
	Min.	Max.	Min.	Max.	Min.	Max.
1-A	$\frac{3}{4}$ "	12"	$\frac{3}{4}$ "	5"	24	4
2-B	$\frac{1}{2}$ "	25"	$\frac{1}{2}$ "	8"	24	3
4-B	1"	49"	1"	18"	12	2
5-B	1"	61"	1"	18"	12	2
10-B	$3\frac{3}{4}$ "	120"	2"	24"	8	$1\frac{1}{4}$
12-F	$8\frac{1}{2}$ "	240"	6"	54"	5	$\frac{3}{4}$
12-G	3"	264"	8"	60"	5	$\frac{1}{2}$

## FARREL-BIRMINGHAM COMPANY, INC.

333 Vulcan St., Buffalo, N. Y.

## "Production Experience with Surface Broaching"

(Concluded from Page 42)

### Equipment:

**Machine**—Two vertical double broaching machines, mechanically operated.

**Fixture and Operation**—The machine slide has two broaches, so two pieces at a time are broached. The fixture is stationary, so, after the slide goes down, it is stopped until

the work is removed. Cycle: Broach is up. Load fixture by screwing part in lower half of the split locator, up to a fixed stop. Clamp each pin separately by cam clamp hand operated. Broach cuts down. Unload. Broach moves up.

**Broach**—Broach details are 14 in. long, approximately  $1\frac{1}{2}$  in. wide and 1 in. thick and made of H. S.

steel. Eight details are required for setting up the complete machine on both sides. Broach speed is 30 ft. per minute.

**Production**—179 parts per hour per machine.

**Broach Cost**—The available broach life is .080 in., about .005 in. being removed per grind, giving a total of 16 grinds. In spite of the amount of stock, about 9000 pieces are finished between grinds and the average broach cost at present is \$.0019 per piece. These experiences are based on the production of sets of parts for several hundred thousand cars, and we feel that these are rather dependable data in considering equipment of this nature. The broach as a cutting tool, of course, has the inherent advantage that the leading teeth are always roughers and the trailing teeth are always finishers. With a milling cutter, in contrast, the blades are first in contact with the rough and sometimes uneven surface and later are expected to produce a reasonably good finish. Except for the first tooth in a broach, the amount of stock removed by each tooth is always the same, provided the grinding is uniform. Another characteristic that favors the broach is the fact that a very heavy and substantial broach holder and slide, made of cheap materials, furnishes the stiffness required for smooth action and the amount of expensive high speed steel is considerably less in proportion to the amount of metal removed per hour. While we have experienced the usual troubles incident to getting new set-ups into full production, the average broaching machine is a much simpler, more rugged and trouble-free mechanism than the average milling machine and, in general, is less costly in original investment, in maintenance of machine, cutting tools, in floor space and manpower. One of the inherent advantages of broaching is that separate roughing and finishing operations so common in milling practice are not required, which in itself saves half the total machine cost for the surface under consideration. In conclusion, our experience indicates that in specifying surface broaching equipment we should be sure of ample tonnage or capacity in the machine, and we have found some tendency on the part of the machine tool builders to underrate the capacity required for a given job, possibly in their effort to keep the required investment as low as possible. This is false economy. The pressures involved vary greatly with the type of work, length of broach and other considerations, but absolutely rigid fixtures, free from spring and chatter and with very positive means of holding the part against the pressure of the cut, are of vital importance.